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The Potash Situation

THE hearings before the Ways and Means Committee respecting legislation for the protection of the potash industry brought out some interesting points in regard to the potash resources of the United States. Perhaps the most important information is that even in the opinion of the high-cost producers, within a period of five years an American potash industry could stand upon its own merits in competition with foreign sources.

Much of the time allotted to the hearing of the potash question was consumed in an endeavor to solicit answers that could be used to political advantage, while the main question was often entirely overlooked. It is regrettable that partisan politics took such a prominent part in the hearing, for the heart of the matter is not a partisan question.

From our point of view the question at issue is this: Is it to the interest of the American people at large that there should be maintained within the United States a new industry, the raw material for which is here in abundance, and the finished product of which is essential to our welfare? Or is it to the interest of Americans generally that we should continue to derive our potash from foreign sources, save the public the expense of establishing a new industry, lose the experience and money already invested in the business, and remain dependent upon foreign supplies?

That potash is the substance under consideration is only incidental to the foregoing issue. A national policy is involved that with justice should be applied to all new industry. It is exactly similar to the glass, percelain, chemical, and dye industries, and involves the possibility of high costs, until the new industry is strong enough to compete with foreign offerings.

There are two sides to the question, with more or less reason on both. However, history has proved that the prosperity of this country is built largely upon our industries, for a time artificially cultivated. This is admitted by the free trade advocates, and that the majority of the people believe it is evidenced by the various tariff laws that have been put in force to encourage the growth of industry.

What advantage would accrue to the American people through the establishment of a successful potash industry in the United States, and what would it cost them to establish it? While these questions were incompletely answered, the following points bearing upon them were brought out at the hearing: The normal consumption of potash in this country under pre-war conditions was approximately 250,000 tons, worth at Atlantic ports about $10,000,000. Very little of this was brought to the country in American-owned vessels. Hence, approximately $10,000,000 was spent by the United States for the benefit of foreign labor and capital. In these days when the public thinks of billions as it used to think of millions, this may not appear to be a very large sum, and yet if expended in labor, transportation and interest on invested capital, it means considerable industrial development.

At the hearing the opinion was expressed that in the post-war period the price of the imported material lacking domestic competition might be expected to reach nearly double the above sum, or $20,000,000, assuming that imports would be practically the same. And it is fair to assume that they would equal former imports even at double the figure, because our farming districts have suffered materially for lack of potash salts during four or five years. Hence it appears to be a question of either spending at home or abroad $20,000,000 and no economist could say that it would be disadvantageous to have this amount of money working in America rather than abroad.

However, it is believed that protection should not be so complete as to prevent all importation, but preferably that a portion of our normal supplies be permitted to come from abroad. Under these circumstances the whole of the estimated figure, $20,000,000, would not be retained for home industries. Some competition is necessary, but should the industry be developed to a degree permitting of competition with German and French potash, we may ourselves begin to export to those countries favorably situated geographically, so that the ultimate aim is not merely that of supplying a portion of our own needs, but rather the cultivation of an industry that will do this and at the same time expand continuously, supplying both home and foreign markets.

The second gain of importance to America in the development of domestic supply is scarcely measureable in dollars. It is being independent of imports at a time when imports are impossible. We never expect to see that day, but it is just as possible to come in the days ahead as in those that are past. The price paid for potash during the war, when it reached more than ten times the normal figure, is an indication of the importance of such a domestic supply. But this is not the true index of the necessity, for it remained practically unprocurable for agricultural purposes for a long time. The maney loss to agriculture cannot be calculated, but it is probably large.

The third advantage in establishing the industry lies in the conservation of the capital that has already been spent in building plants, in the preservation of the experience that has been gained and the skill that has been developed.

There may have been unwise or dishonest promotions in the potash industry, but there has been a very large amount of money spent legitimately and intelligently in an endeavor to make our resources of commercial value. Valuable experience has been gained and labor has acquired skill in conducting operations. Loss of these means national loss. The fact that a few plants

have been able to write off a portion or all of their invested capital does not make the national loss any less if those properties must now be abandoned.

The fourth point of advantage lies in the fact that the encouragement of the domestic industry would form the basis for further investments of a legitimate nature in this country. There will undoubtedly be further fraudulent or unwise promotions, but probably no more in any other line of business.

One great difficulty a Ways and Means Committee or a Tariff Commission always encounters in its efforts to appraise correctly a manufacturing situation is that the high-cost producers are most vociferous in their demand for protection, while the low-cost producers sit back and take whatever Congress will give them as so much added margin. A policy acceptable to a great proportion of thinking men is that which provides tariff protection equal to the difference in cost of production here and abroad. Theoretically this is simple; practically it is most difficult to get an idea of correct costs at home, and almost impossible to appraise foreign conditions.

Here lies the difference between the potash industry and the glass, porcelain, chemical, and dye industry. With an almost unlimited amount of raw material, with a market absorbing potash by hundreds of thousands of tons, with the well-known American faculty toward quantity production, the potash industry as a whole has yet to demonstrate to a critical observer that with sound financing and correct technology it cannot *now* put potash on cars in quantity and at a profit at the same price Europeans can put it aboard ships. If this be true, cannot we reduce our post-war costs as rapidly as can they? And do we then need a higher tariff than would equalize rail and water freights?

We have learned that potash probably cannot be produced commercially from kelp. The Nebraska potash men now admit that they can get their salt more economically than in the past. Potash recovered as a by-product at cement plants promises to amount to a very respectable tonnage, and in our opinion will eventually command the local market. We have in many feldspars percentages of potash almost equal to that contained in the German and French salts as mined, and though their commercial use in quantities has not yet been realized, the question of their utilization may soon be solved, to the great advantage of the United States.

Danger!

MINE-OWNERS and refiners of metal, you are paying 35%* of all the money that is collected from the public for railway service. You are more vitally interested in low railway tariffs and adequate service than any other class of producers in the United States. What steps are you taking to see that your interests are protected? Are you prepared to see the Government take over the railways and place them in the hands of those who are now asking that this thing be done?

You may ridicule the idea as grotesque, as inconceivable for a sane people, as impossible; but it is no more impossible than that a wave of prohibition swept over the land, to the astonishment of millions; no more impossible than that we were at war with Germany in a few short months after it was positively asserted that civilization would not permit such a thing. You are not facing what is for the moment a popular fancy. You confront a well-organized body of determined men, backed with the force of numbers.

This is not an imagined danger—it is a real one that threatens you, demanding active resistance, as active and as aggressive as the force that is contending to destroy our present industrial life. Can you imagine that with the railways in the hands of a labor party, your industries, so dependent upon transportation facilities, can thrive as they have done in the past? Your industries and those depending upon them are sure to suffer. The fact that your laborers are going to cast their votes for Government ownership and suffer in consequence is no reason for your not making every effort to protect yourself and to protect them from their own acts due to ignorance or misinformation. You face something worse than increased costs and decrease of business. Raising transportation charges will not be the end. From the ownership of inter-state railways and their management by their workers it is only a step to the ownership of other public utilities; only two steps to the national ownership of our fuel supplies, coal mines and oil wells; only three steps to the nationalization of all mines and of all private industry.

The boasted strength of the labor unions is not a vain boast. Theirs is a real organization, supplied with money, votes, and misguided but able brains, which can be overcome only by abler men acting in harmony for the safety of their country. Unfortunately, the latter will be supported by an indifferent public united by no bonds, and recognizing and supporting no leaders.

Though this soviet idea will be supported by the votes of many laboring men it must not be regarded as a class contest. It is a national question, a contest for the preservation of individual rights, for the fundamental principles that have made America what it is today. If the railway labor organizations insist upon making government ownership a question of party politics, and any party makes this one of the main planks of its platform, then the contest will have to be fought on political lines. This would be unfortunate and should be avoided if possible, as it will inevitably develop a labor party and a class spirit in respect to a matter wherein the true interest of laborer and investor are identical.

The avoidance of a class contest can best be accomplished through the enlightenment of labor, by showing labor what line of action will be to its advantage and what to its disadvantage. The average American laborer is not stupid; he will take the right course if he can be shown what is the right course. If it is pointed out to the miner that his leaders in Washington have made the threat that under certain circumstances "the railways will be shut down so tight that not a wheel will turn," he may wonder what is going to happen to him and his family while no trains are moving. If it is drawn to his attention that those leaders are opposed to the right of a man to will his savings to his children, the miner can see that he is following a leader who is opposed to one of the dearest privileges that the human being possesses, the right to care for and protect his offspring.

Above all other things, that one for which labor should strive, or even fight, is the opportunity to do honest work and accumulate a fund as a protection to old age,

*Bureau of Railway News and Statistics, year ending June 30, 1914.

or for dependent children. Any device conceived by man to interfere with this the workingman should fight with vigor, and the proposal now made by the leaders of the railway organizations is a long step toward the removal of the privilege of every worker to be the master of his own destiny.

Mining Investments

A FEW years ago it was not uncommon when speaking of mine investments, even to those who made a business of mining, to hear the idea expressed that the investor preferred gold mining to the mining of any other metal because he could safely count on the market value of his product. The prices of coal, iron, petroleum, copper, and silver all varied with the rapidly varying demands and new discoveries, while gold was always worth $20.67 per ounce. We confess to having shared to some extent in the wisdom or fallacy of this attitude and to have thought that gold was not exactly a commodity in the sense that other useful metals are so regarded. However, conditions in the gold mining industry today are such that, so far as marketing is concerned, there is a very close resemblance between gold and any other natural product.

We are learning that $20.67 is only a yardstick. It means no more than "an ounce of pure gold"; that the value of the metal is not to be gaged in dollars but in the amount of necessities, happiness or luxuries that a unit of it may be traded for. Our faith in gold has been shaken. We can no longer say that a vein of $10 gold ore is just as good as money in the bank, or that a 50c. placer makes an absolutely safe dredging proposition. We are learning that in the discussion of new business it is not so important to consider what the element is which is to be mined, but the important point is to determine the market for it.

We may not wish to consider petroleum, potash, or copper mining for some real or imagined difficulty inseparable from the business, and yet any one of them may be good or poor business, depending upon the amount that can be produced per unit of endeavor—capital or labor—and the amount of necessities a unit of product may be traded for. The same argument applies to gold mining.

It may be suggested that we are simply calling attention to the fact that gold mining should no longer be set upon a pedestal as being without risk, and should be placed upon the same plane as other mining ventures, with all their attending uncertainties. That is not quite the idea. We would rather say that the business of mining other elements does not occupy an inferior position to that of gold mining. The prices of other natural products may rise or fall more rapidly, but all are influenced more or less by the same laws, the laws of supply and demand.

In mentioning uncertainties, we would not give the impression that there are more uncertainties in mining than in industrial enterprises generally, for there are not. And this is another thing that we are learning: The gilt-edged security is something that is passing into history. Not long ago the securities of public utility corporations were classed as safe investments for trust funds. Today your banker is reluctant to mention any investment as safe. Not long ago we believed that there was at least one thing that the American people would continue to do forever, that was to ride to and from their business and pay for the accommodation. Hence we thought that shares in transportation systems (some of them) would form gilt-edged securities. People will always ride, but at the present day they are not paying for it. Our reasoning was slightly at fault. Today we believe that for years to come people will be moved by gasoline, hence the economical production of gasoline must be good business, and better and safer than the building of railways. But some day people may decide not to pay for this privilege, as is now the case with railways. If so, Standard Oil shares will be flat.

Whether it be manufacturing, building or mining, and whether it be the business of pumping oil, mining coal, iron or other metal or gem, no product can be considered to have a permanent value. The value of the product and the success of the business, other things being equal, will depend upon the market for the output. If the value in trade is above the average cost of production the business may succeed; if below, it will fail. Gold is no exception.

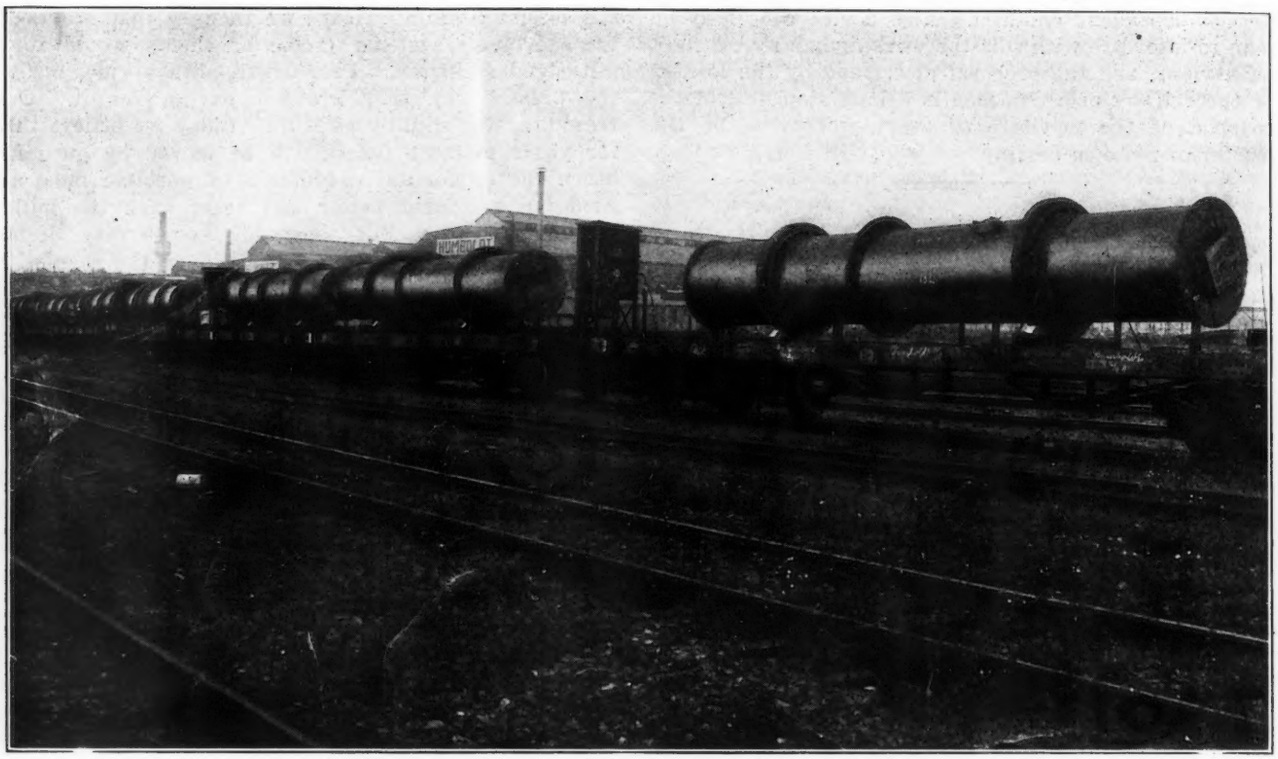
Industrial Corporation Schools

THE success that has attended the establishment of trade schools in various industries offers sufficient argument for their continuance. As applied to the mining field, the results obtained in the few instances where such systems have been put into practice have proved of such value that there is every reason to believe that further development is to be expected. A general analysis of the labor situation will serve as additional argument in their behalf. Foreign labor, upon which mine operation has been largely dependent, will undoubtedly be restricted, and its supply, plentiful in the past, will for some time be only irregular and intermittent. The increasing interest in labor-saving devices in the last few years suggests that operators anticipate the time when labor will be at a premium. In many instances machine-performed work has been done at a saving; in others it has been found that the costs parallel those obtained by hand labor, and in some cases the former resulted in a loss; but the work has been necessary regardless of cost.

Assuming, then, that there is to be a general adaptation of mechanical devices and the utilization of modernized machinery, it is to be expected that their operation will require the services of highly skilled labor. The rising costs of supplies make conservation necessary, and this is obtainable only through the employment of labor that is thoroughly familiar with the methods that effect efficient mine operation. The further education of men in subordinate positions assures a future supply of executives which will in turn demand higher intelligence from the men under them.

So-called trade schools must necessarily differ from institutions of ordinary learning. In the first place, their requirements demand specialization of thought. The success of a practical mining course depends on the selection of a schedule that will encourage independent thinking and co-ordination of ideas.

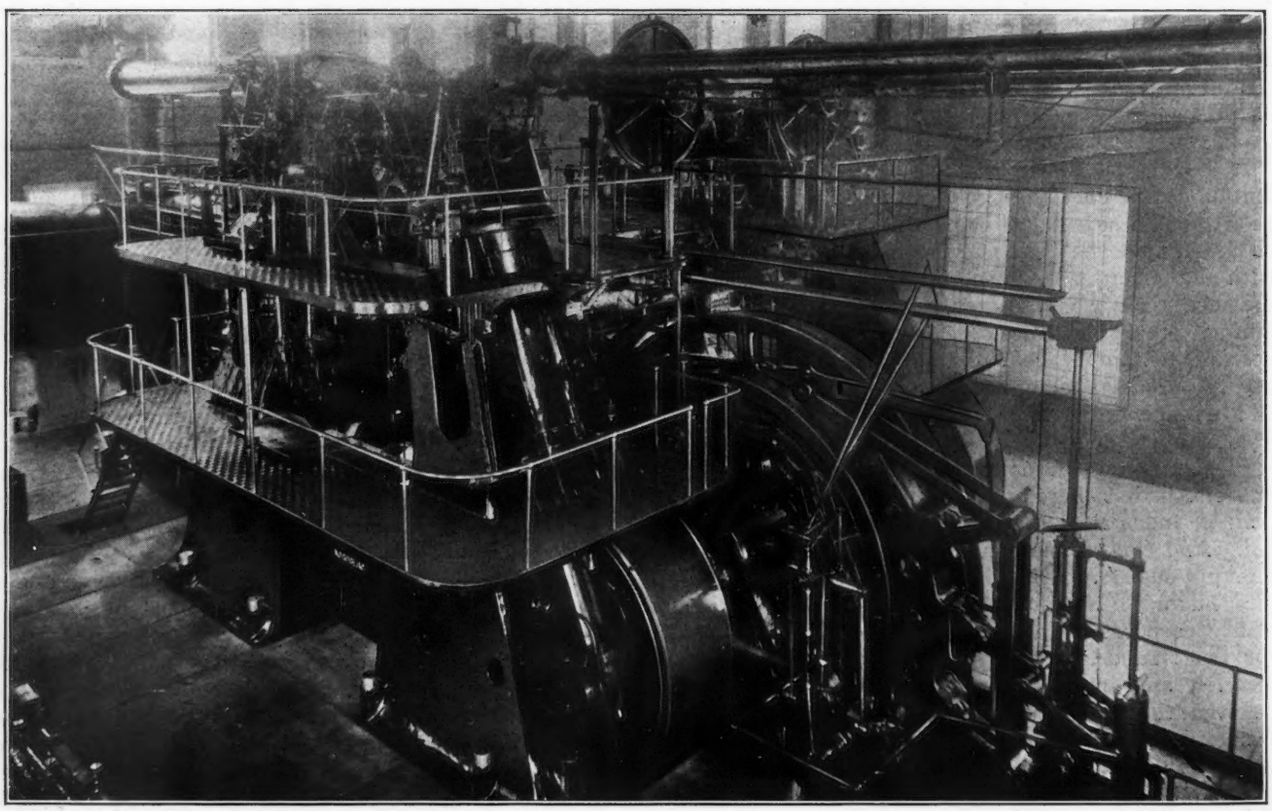
The opinions of capital and labor are not infrequently at variance with each other, but such institutions as industrial trade schools will greatly aid them in a better understanding. A common point of contact is established. Capital, on the one hand, acquires a better understanding of the capabilities and capacities of labor, and the latter receives a clearer insight to the requirements demanded in the operation of enterprise.



LEACHING DRUMS PREPARATORY TO SHIPMENT TO THE CHILE EXPLORATION CO., CHUQUICAMATA, CHILE, FROM PLANT OF THE HUMBOLT ENGINEERING WORKS CO., COLOGNE-KALK, GERMANY
(Photo taken in 1915 and just received)

Photographs From the Field

HOIST AT THE B AND M SHAFT OF THE HOMESTAKE MINING CO., LEAD, S. D.



The Discovery of the Klondike

A New Version of the Story—Great Strike Principally Due to John McDougall, Though He Had No Part in the Gold Rush—Carmack, Actual Discoverer, Established a Unique Record, After Camping Five Years on Rich Ground

BY HENRY BOURSIN
Ozone Park, N. Y.

ABOUT the last of February, 1895, the Steamship "Alki," David Wallace commanding, left Puget Sound and British Columbia ports on her regular northbound trip to Sitka and way ports. Her passenger list included a few old-time Yukoners: a half-dozen or more French-Canadians, owning claims on Miller and Glacier creeks, in the Sixty-mile district, and a pioneer Yukoner named Sam Lansing. Of the chechakos, there were three with whom this story deals—a tinsmith who had sold his business in Butte, Mont.; John McDougall, originally from Bruce County, Ontario; and Dan Hart, a Scotchman.

McDougall's first mining experience had been gained in the Cariboo district in British Columbia, in 1879. Later he had been a subcontractor on the construction of the Canadian Pacific Ry. through British Columbia, and, after the completion of that road, had been a general contractor in British Columbia and Washington. Hart had quit his vocation as carpenter on a British warship, and was going North in search of gold. These three were strangers to each other, but having the same destination and purpose, they had agreed to go into the Yukon country as partners before the "Alki" reached Juneau.

The party disembarked at Juneau, which was then the jumping-off place for Yukoners. In those days two pioneers of Juneau, John Olds and Morris Orton, were running the Occidental Hotel. The three gold seekers put up there, and, a few days later, having purchased Yukon outfits, were impatiently awaiting favorable weather for crossing Chilkoot Pass.

When a man intends prospecting a country new to him, he acquires in advance such information as he can gather concerning it. McDougall had been doing this on the way up the coast and at Juneau. He learned that the Stewart River bars were worked out, and that there was small chance of locating pay ground in Forty-mile and Sixty-mile districts; further, that the latter districts were on the same gold belt; and finally, that the country rock there was schist and slate, trending seemingly toward the Stewart River diggings.

McDOUGALL HAS A BRIGHT IDEA

McDougall had not gone far into these details when there occurred to him a suspicion which rapidly grew to the dimensions of a theory. It was this: Perhaps those three districts were on the same gold belt; if so, between Sixty-mile and Stewart River was a good place to prospect.

One day while loafing about the hotel, McDougall searched out Lansing, who had mined in all the districts mentioned, to renew their talks about Yukon diggings. To get his fragmentary information straight in his mind and keep it so, and to focus that information on a definite place, he had gone to Dick Nelson's Post Office stationery store and procured a sheet of paper. Returning to the hotel, he put the paper on a billiard table, and, in the presence of fifteen or twenty men, with Lansing dictating the position of diggings and streams, he made a map to jibe with Lansing's idea of the lay of the land. It was not a pretty map, but it is not often that a Geological Survey cartographer with a string of initials trailing after his name can make one that leads to more gold.

After getting Lansing's ideas on paper, McDougall drew a line from Forty-mile diggings to Stewart River diggings, and asked: "Where's the highest ground along that line?" "There," said Lansing, indicating a place between the Yukon and Stewart rivers. "Has anybody prospected there?" was the next question. "No," was the reply. "That's where the fresh meat for Forty-mile comes from; it's called the 'moose pasture.'" McDougall drew half an oval, which with the straight line inclosed the north half of the "moose pasture," and, turning to his partners, said: "Boys, we will prospect on the north slope of the 'moose pasture.'"

In reaching this conclusion McDougall put to astonishing use what he knew of the occurrence of placer gold near Barkerville, B. C., where the extremely rich creeks flow northerly from a prominent mountain, whereas the south creeks are comparatively poor, though all are in schist and slate country rock.

The map was handed to Hart, who stowed it away in an inside pocket. Surely, not a man present had the least suspicion that on it was exactly shown one of the richest placer fields ever discovered, and that it would be found by following that crude sketch. They saw only a tall, quiet, big-boned man making a map of a country he had not seen.

FATE SPOILS THE GOLD SEEKERS' PLANS

Before the end of this recital of mining history is reached, it will be seen that Fate never intended McDougall, Hart, and the tinsmith to reap fame and fortune as the discoverers of the Klondike; that will stick out like an ounce nugget in a spoonful of black sand. Those men fully intended prospecting there and nowhere else. Their outfit had been bought, and they awaited only favorable weather for crossing Chilkoot Pass. It is at this fair-seeming stage when Fate first shows a contrary, even malevolent, disposition toward McDougall and Hart.

Although the calendar said "spring," the weather belied it. There were frequent and heavy snowfalls on the pass, and the danger from snow-slides was great. Some of the Frenchmen boarded a steam launch every week or ten days and went to Dyea to see how the pass looked. With disgusting frequency the report was the same. They were as eager as any to cross the range; their courage was undoubted, and they were learned in the treacheries of sullen mountains; so when they returned and said, "She's bad; better we go bam-bye," the unanimous opinion prevailed that a start bye and

bye was soon enough. Thus the start was delayed until the middle of April.

In the meantime other things conspired with the weather to sidetrack McDougall. A mild mining excitement developed at Juneau concerning the beach diggings at Latuya Bay, where gold had been found a few years before. It was reported that George Wheelock and Captain Cole were working fifteen men on ground seven miles west of the bay and were clearing $150 a day; and that Dave Spurgeon, working alone on ground four miles east of the bay, was washing out from $7 to $20 a day.

McDougall Urged To Go to Latuya

These rumors sounded good, and three men from Portland, Ore., were seized with a strong desire to try their luck in that region. The little schooner "Seagull" lay in the harbor at the time; so the Portland men tried to induce the owners, two cousins named McKinnon, to take them to Latuya, transportation free, the McKinnons to share and share alike with the prospectors in any locations made. The McKinnons were tempted but not stampeded; it cannily occurred to them that they knew nothing of the gold-finding capability of the Oregonians, whereas, there was a man in town in whom they had large confidence. So they agreed to go if McDougall joined the party.

The reason why the McKinnons wanted McDougall to go dated from 1889, when the latter was a contractor at Port Townsend, Wash., and the McKinnons were halibut-fishing out of that port. About twenty or more years before, a Mexican had found gold on the beach at Port Townsend, where, tradition says, he worked out a small patch which paid $2 a day with a rocker. This beach gold was supposed to have been thrown up by the sea, until McDougall, in 1889, found that it came from the bluff above. The result was a brief but vivid mining excitement on ground which had been trodden by the feet of countless thousands. Wherefore, McDougall's judgment on beach-diggings was held in high esteem by these schoonermen. Of course, McDougall was strongly urged Latuya-ward.

During this time of delay and of doubt as to which of two contrary courses promised the fairest, McDougall had in mind the probability of securing a contract in British Columbia the following autumn, and that in case he found nothing surely profitable in the meantime, he would return to British Columbia in the hope of securing the contract. At that time there was no railway from tidewater to the Yukon. The miners who crossed the range hand-sleighed their outfits from Dyea to the lakes at the head of the river, where they whipsawed lumber and built boats in which the journey was continued down-stream to some tributary, then upstream to diggings or failure. It all consumed time, as may be imagined. To come out in the autumn by the same route they poled a boat up-stream six hundred miles. To go in and out of the country the same season left but a fraction of a Yukon summer for prospecting. In the McDougall case, every day of delay in starting was a day off that fraction.

The conspiracy of events succeeded. It would have fooled anybody. McDougall sold his share in the Yukon outfit to Hart and the tinsmith, and went to Layuta. There he found opportunity only for more capital than he had, and returned to Juneau the latter part of June, thence going to British Columbia. He was in Cariboo, B. C., when the news of the Klondike strike reached him.

Hart and the tinsmith had left Juneau the middle of April in company with Lansing and the Frenchman. Lansing pointed out the "moose pasture" to them on the way down river, but instead of stopping to prospect, they continued on to the town of Forty-mile to replenish their stock of provisions, a part of which had spoiled from getting wet. At Forty-mile the tinsmith abandoned his prospecting notions on finding that he could earn $20 a day as the town tinker, which seemed a good-enough gold mine to him. In after years he owned a hardware store at Dawson, and later was in the same business in a large way at Nome. Perhaps he is there yet. The reason his name is not mentioned is because McDougall has forgotten it.

One man can go nowhere up-stream poling a boat on the upper Yukon and tributaries. Consequently, the brisk demand for a tinker having deprived him of his partner, Hart cast about for another, and found one in a Scandinavian named Hansen.

These two then poled up the Yukon to prospect the north slope of the "moose pasture." The river now known as the Klondike is the stream they should have turned into on leaving the Yukon. The east side of the Yukon along that part of the river is bad poling, so that all up-river boatmen hug the west shore, which is the opposite one from the Klondike side. So, when their goal, the hills now known as Dome Range, was neared, they were on the opposite side of the Yukon, where the poling is good, and failed to see the mouth of the Klondike, which was hidden by wooded islands. Here was an error in judgment. When they finally crossed over to the east side they had passed the mouth of the Klondike; and, instead of dropping down, they continued upstream and pulled into the Indian River, the first tributary south of the Klondike.

Hart and Hansen Miss the Big Strike

The boat was taken up the Indian River to the mouth of Quartz Creek and left there. Both Hart and Hansen could see before this that they were south of where they wished to go—that they were on the south slope of the "moose pasture." So they began packing their outfit up the valley of Quartz Creek. On coming to its second tributary, since known as Little Blanche Creek, they headed up that valley which runs from the south side of the Dome Range, as the easiest way to reach the north side. Unfortunately, at a place near the mouth of Little Blanche Creek where they camped, a coarse-gold prospect was found in shallow ground. It was the first native gold Hart had ever seen, and he told McDougall years after, "It looked good to us." There they stayed, washing out gold, until a shortage of supplies should compel a return to Forty-mile.

Although Hart still had the map, it had ceased to pull him along. Several times he suggested going over the range to the north side, but Hansen always demurred, arguing that they ought to stay at work and wash out enough gold to buy their outfit for next year. They never knew how much gold they washed out that summer, having no scales with which to weigh it, but they guessed the total at $2,000. Had they gone five miles further, just across the Dome Range to the northern slope, they would have found Eldorado Creek, world-wide fame, and a million dollars to the five-hundred foot claim. When most of their food had disappeared, and

the remainder was nearing an end, and when the frosty nights hinted at winter's swift approach, and their raiment was a time-worn joke, they took the back track for Forty-mile.

They arrived there, agreed on a crafty plan, namely, to tell no one about their diggings, and to expend their joint capital so as to put in a year of prospecting in the "moose pasture."

The best-laid plans of mice and men
Gang aft agley.

It seldom falls to the lot of man, however, to miscalculate by so wide a margin as did Hart and Hansen. If they had agreed to go on a $2,000,000 spree, the plan would not have gone awry, for that is about what happened. Just how it occurred is, of course, somewhat hazy, but Hart remembers that Carmack was there. Anyway, when their exhilaration had passed, they had splashed their dab of dust into the channels of trade, and where it came from was no secret.

GEORGE CARMACK "DISCOVERS" THE KLONDIKE

George Carmack, assisted by his two Indian brothers-in-law, supplied the town with moose meat; which they obtained, as has been said, in the "moose pasture." Hence, when Carmack and family went to the "moose pasture" the next spring, they had pick, pan and shovel with them. Also the same spring, Bob Henderson began prospecting on the north slope of the pasture, and found pay diggings on a creek which he named Gold Bottom.

Not until 1897 did Carmack take out enough gold to convince the old-timers that he actually had struck something good in the "moose pasture." Cheechakos were more credulous; they believed the impossible—and found themselves rich.

As a gold discoverer George Carmack has a record that is absolutely unique—it probably never will be beaten. For five years he camped every summer where the very spot occupied by his tent was underlaid by some of the richest gold gravel ever found. Following his "discovery" other men found gold in plain sight on the bare bedrock of Big Skookum Gulch, about 1,000 ft. from his camp. At about the same distance, on No. 2 above Carmack's Discovery claim, three pans of gravel, averaging $1,100 to the pan, were taken from a depth of one foot below the surface. Gold Hill, also but a few hundred feet distant from his camp ground, had a string of claims averaging $500,000 to the claim. Year after year he camped on and walked over gold galore without the shadow of a suspicion crossing his mind that the country was worth a tinker's dam except for moose meat.

Hart was several hundred miles down the Yukon, repairing a river steamer for Jack McQuestion, when the news of Carmack's Klondike strike became known. From sheer disgust with himself, no doubt, he never returned to the Little Blanche diggings or went to the Klondike, but continued on at his trade during the gold excitement. In 1901, when McDougall first went into the Yukon country, he met Hart at Forty-mile. The latter was then in charge of the mining operations of the North American Transportation & Trading Co. in the Copper River country. He said: "If you had been with me, we would have got there." What became of Hansen is unknown.

McDougall was in the Yukon country off and on from 1901 till 1904, but found no claim which paid well. The best he did there was $7 a day on a claim on Clear Creek. As late as 1904, Lansing was in charge of the mining operations of the Ladue company in the Klondike.

It is probable that gold would have been found in the Klondike region years before 1895 but for the presence of Carmack there. It works out thus: The district was known for years to all Yukoners as his hunting ground; and, although he was not a prospector, it would seem inconceivable that anyone could camp and roam in a gold country for years and never see a sign—this in a land where every man and woman was supposed to be a bit of a prospector and the very babes played at mining. To most men it would appear as if there were too many impossibilities to consider that one. Again: By the time two men poled store-grub up a river or two, then packed or sleighed it over a divide or two, the cost of that grub-pile in money and hardship was such that its use as food might almost be classed as a luxury. In fact a man and his dog-team would devour $1,000 yearly. Consequently, what game and fish he could get was a matter for serious consideration, for under the most favorable circumstances he could cut 75 per cent from the cost of his provender. Therefore not only was the Carmack presence in the "moose pasture" regarded as conclusive evidence that it contained no rich diggings, but his business there was distinctly harmful from the prospector's point of view, for by every moose he killed the probability of a prospector going there was thereby lessened.

Increase in Steel-Ingot Output

The output of ingots by steel works in the United States in the month of July amounted to 2,984,858 gross tons, or 114,802 tons a day for twenty-six working days, as compared with 2,640,984 tons, or 105,639 tons daily, in June, according to *Iron Age*. The July output was at the rate of about 35,473,886 gross tons a year, based on 309 operating days and on reports to the American Iron and Steel Institute from thirty companies, which in 1918 made 84.03 per cent of the total production.

The accompanying table gives the tonnage of steel ingots produced in 1918 by twenty-nine companies, making in 1917 about 85.10 per cent of the entire amount, and for the last seven months figures from thirty companies making 84.03 per cent of the production in 1918.

MONTHLY PRODUCTION OF STEEL INGOTS, IN TONS

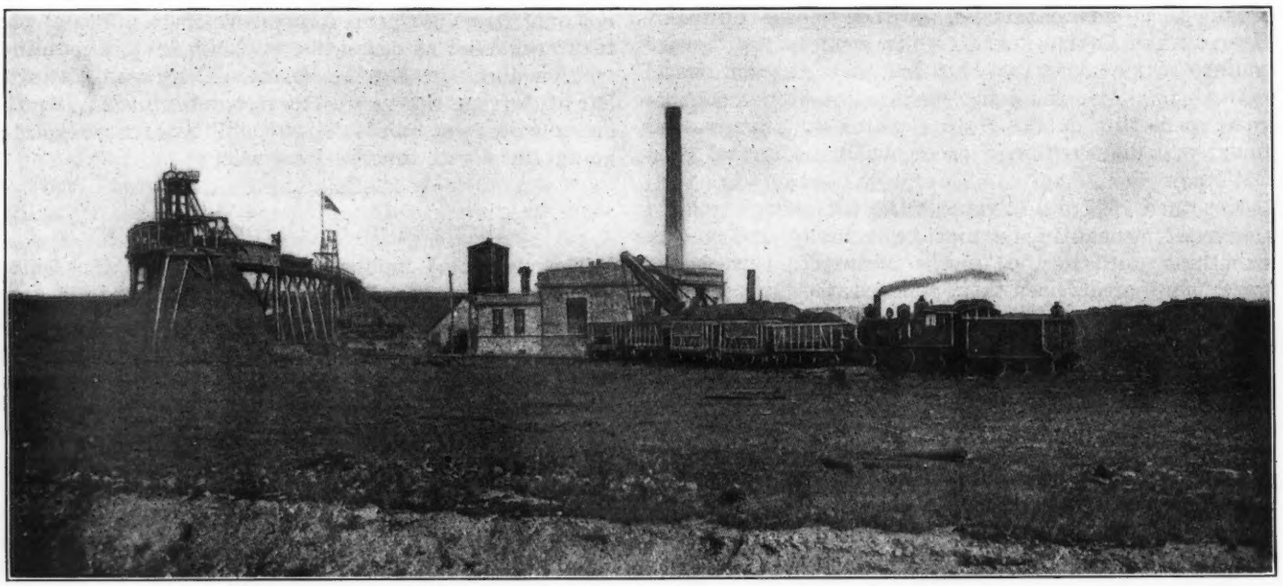
1918	Open-Hearth	Bessemer	All Other	Total
January	1,763,356	429,588	10,901	2,203,845
February	1,805,233	454,457	14,051	2,273,741
March	2,331,048	763,255	16,078	3,110,381
April	2,377,974	769,249	16,187	3,163,410
May	2,475,131	796,244	15,858	3,287,233
June	2,281,718	786,380	15,348	3,083,446
July	2,311,545	784,997	17,093	3,113,635
August	2,299,177	766,860	17,643	3,083,680
September	2,407,993	772,863	16,802	3,197,658
October	2,527,776	807,043	17,377	3,352,196
November	2,291,720	753,409	15,631	3,060,760
December	2,273,189	706,844	12,273	2,992,306
Total	27,145,860	8,591,189	185,242	35,922,291
1919				
January	2,351,153	749,346	7,279	3,107,778
February	2,043,635	655,206	5,842	2,704,683
March	2,100,528	555,332	6,405	2,662,265
April	1,732,447	500,770	6,494	2,239,711
May	1,506,015	414,392	8,617	1,929,024
June	1,692,257	521,634	5,328	2,219,219
July	1,875,630	625,246	7,300	2,508,176
Seven months	13,301,665	4,021,856	47,265	17,370,856

Transvaal Gold Production in July was 725,497 oz., compared with 736,199 oz. in July of last year. The total for the first seven months of the year is 4,872,981 oz.

Minnesota State-Owned Iron Mines

Administration of Commonwealth Lands, Leased to Operators on a Royalty Basis, With Minimum Yearly Shipments Specified, Vested in State Auditor and an Organized Mines Department—Official Report Pronounces System a Success

EARLY in its history as an organized state, Minnesota, under Federal grant, became possessed of 8,402,046 acres of land, or one-sixth of the total area of the commonwealth. With the advance of settlement, new acreages became valuable and passed to private ownership in fee simple until in 1889, when the increasing number of iron-ore discoveries in northern Minnesota caused the Legislature to enact laws reserving to the state mineral rights in all state lands thereafter sold in St. Louis, Lake, or Cook counties. This enactment was later amended to include all state lands, and by virtue of these statutes the State of Minnesota is the largest single fee owner of iron-ore deposits in the United States.



THE PHILBIN MINE, NEAR HIBBING. ONE OF THE STATE- OWNED MINES IN MINNESOTA

The property comprises 31,560 acres on the Mesabi Range, 4,640 acres on the Vermilion Range and 4,200 acres on the Cuyuna Range, according to the limits of these districts as now recognized by the best authorities. In addition, there are large acreages in the prospective Gunflint, Highland, and Ottertail districts, and about 520 acres in the magnetic formation at the eastern extremity of the Mesabi Range. The proved tonnage on such portions of these tracts as are already under lease is estimated by the Minnesota State Tax Commission at 173,137,125, as compared with 1,430,711,297 tons which the commission recognizes as the total amount of merchantable iron ore now proved to exist in the state. The same Legislature which reserved to Minnesota the mineral rights of state lands also established the state as a fee owner and determined its duties as such. Laws were enacted making provision for a standard lease, stipulations were made covering the necessary mine inspection, and adequate distribution of the income was arranged.

The state lease, which is operative for fifty years from the date of its execution, provides that the lessee shall be permitted during that period the privilege of removing all the "merchantable, shipping, iron ore" which is to be procured "in such manner only as is usual and customary in skillful and proper mining operations of such character." It is provided, also, that within five years after a railroad has been laid within one mile of the property the lessee shall ship therefrom at least one thousand tons of iron ore, and that each year thereafter he shall ship a minimum of five thousand tons annually. Failing this provision, the lessee shall pay the state a minimum ground rental equivalent to the income which would have been derived from royalties on such shipment. The royalty so paid is 25c. per ton, and payment of such money in the failure to ship iron ore has been held by the courts to be in no sense an advance royalty, but merely a ground rental, and is forever lost to the lessee. Under this law, 873 leases have been made, of which all but 91 have been canceled, and of these 38 have been developed and become active shippers.

The question of ownership of iron ore underlying lake bottoms was in dispute for some time, but has been decided in favor of the state, and the 1917 Legislature enacted laws covering the leasing of these properties. It is provided that all such leases shall be sold at public auction to the highest bidder, but that the minimum bid acceptable shall be at least 50c. per ton royalty. The other terms of the lease are to be decided for each property thus disposed of by a committee consisting of the Governor, the Attorney General and the State Auditor. A proved orebody of 3,000,000 tons lying under Syracuse Lake, at the eastern end of the Mesabi Range, has been leased for the minimum under this law.

Shipments from state properties to Aug. 1, 1918, totaled 25,546,168 tons, the royalties from which had yielded the state $6,386,542. Based on the present estimated tonnage, and assuming that none of the state properties excepting those now under lease will ever yield any iron ore, the ultimate return to the state from royalties alone will amount to $49,670,883.

The following is a list of state-owned properties which have been developed and have entered the shipping list:

STATE-OWNED IRON-ORE PROPERTIES IN MINNESOTA

Mine	Operator	Tons Shipped in 1918
Missabe Mountain	Oliver Iron Mining Co.	1,173,312
Leonidas	Oliver Iron Mining Co.	656,735
Pool	Oliver Iron Mining Co.	191,434
Grant	Interstate Iron Co.	117,407
Hanna	Consumers' Ore Co.	116,082
Woodbridge	Fort Henry Mining Co.	209,414
Wacoutah "A"	Consumers' Ore Co.	174,442
Wacoutah "B"	Consumers' Ore Co.	947
Scranton	Pickands, Mather Co.	.....
Helmer	Cleveland-Cliffs Iron Co.	207,643
Duncan	Oliver Iron Mining Co.	5,159
Minnewas	Oliver Iron Mining Co.	.....
Fay	Virginia Iron Mining Co.	.....
Shiras	Oliver Iron Mining Co.	128,402
Frantz	Consumers' Ore Co.	169,777
Seville	A. B. Coates	7,703
Hill Annex	Interstate Iron Co.	559,727
Kevin	Butler Bros.	21,601
Philbin	Oliver Iron Mining Co.	233,484
Prindle	Oliver Iron Mining Co.	.....
Majorca	Hobart Iron Mining Co.	251,999
Morton	Dean Iron Co.	.....
Smith	Butler Bros.	39,292
Margaret	Butler Bros.	44,067
Wanless	Oliver Iron Mining Co.	175,587
Draper	Draper Iron Co.	.....
Pilot	Hanna Ore Mining Co.	.....
Thompson (Cuyuna Range)	Inland Steel Co.	152,648
Martin (Cuyuna Range)	Whitemarsh Mining Co.	1,421
Northland (Cuyuna Range)	Northern Minnesota Iron Co.	.....
Total		4,638,283

The following properties have been abandoned as being worked out:

STATE-OWNED MINES NOW EXHAUSTED

Mine	Operator	Total Tonnage Shipped
Alberta	Lily Mining Co.	136,534
Cavour	Cavour Mining Co.	177,952
Section 17	A. B. Coates	20,802
Eaton	Eaton Mining Co.	3,547
Yates	Consumers' Ore Co.	678,990
Sliver	Virginia Ore Co.	174,813
Maderia	Maderia Mining Co.	195,494
Deacon	Oliver Iron Mining Co.	347,511
Total		1,735,643

Under the law, each parcel of iron-ore land is credited to one of three funds: either the permanent school fund, the permanent university fund, or the swamp-land fund. The income from each lease is placed in a permanent accumulation and credited to its particular fund. The principal remains forever inviolate, the interest only being applied to the purposes designated. Through the fiscal year ending July 31, 1918, the permanent school fund had accumulated $5,514,962, the swamp-land fund, $646,986, and the permanent university fund, $224,593. Investments are made by a committee composed of the Governor, the Treasurer, the Attorney General, the Auditor and the President of the Board of University Regents, and are limited by law to state and municipal bonds.

Organization of the State Mines Department

The entire detail of handling the properties, from the execution of the lease to the collection of the last dollar of royalty, is in the hands of the State Auditor, with headquarters in St. Paul. Under him, and in direct charge of all mine inspection, is the Superintendent of Mines, with offices in Hibbing. This office is maintained by an appropriation from the general fund which amounts at the present time to $80,000 annually. The personnel, in addition to the superintendent, comprises ten mining engineers, two chemists, and an adequate office force, besides several practical mining men, who are employed as inspectors. The activities of the office extend throughout the three ranges (Mesabi, Cuyuna and Vermilion), and, owing to the variegated character of the mines under their inspection, it is safe to say that the work of the mines department includes every phase of mining activity now found in Minnesota. The office has on file complete and up-to-date surveys of all mines under lease, keeps accurate account of all ore shipped, and by means of its laboratory facilities is able quickly and satisfactorily to settle any dispute which may arise as to the merchantability of any particular deposit of ore. Beneficiation of iron ore is of interest to the department because the state owns large tonnages of every known variety of lean ore, and considerable experimentation with washing, drying, screening, sintering, or briquetting of low-grade ores has been performed.

At the request of the State Auditor, the Bureau of Mines recently completed an extended investigation of the method of conducting Minnesota-owned properties. J. R. Finlay and H. T. Eddingfield, mining engineers, were selected for this work, and their report, submitted to the last Legislature, contains a detailed study of the entire iron and steel industry in the state. After going over the drill records, recalculating the ore reserves, observing the manner in which engineers in the State Auditor's office have kept a record of the extraction of ore, and making a close study of the schedules of ore prices which determine the merchantability of iron ores, both investigators declared themselves convinced that the state-owned iron mines have been well and properly administered.

Government Soon To Make Armor And Heavy Forgings

The new naval ordnance plant at South Charleston, W. Va., is soon to begin the manufacture of armor-plate and forgings for guns of large caliber, entirely new lines of work for Government plants. The South Charleston plant is a $19,000,000 enterprise occupying more than 200 acres of land. It will be ready soon for making armor and heavy forgings.

Engineers, metallurgists, and mill and machine shop men will be interested in the positions which are to be filled in the supervisory and subordinate forces. The U. S. Civil Service Commission has announced for this plant the need of a superintendent of melting shops at $5,000 a year, a superintendent of forge shops at $5,000 a year, foremen of heat treatment of armor plate at from $10 to $14.40 a day, foremen of heat treatment of large guns at from $8 to $12.56 a day, foremen of 14,000-ton presses for armor and large caliber guns at from $11.84 to $13.28 a day, foremen of small guns at $8 a day, and foremen of heat treatment of projectiles at $8 a day.

Detailed information and application blanks may be obtained from the U. S. Civil Service Commission, Washington, D. C., or from the secretary of the local board of civil service examiners at the post office or custom house in any of 3,000 cities. Journeyman workmen and helpers should apply direct to the labor board at the South Charleston plant.

Geology of Platinum Deposits—Part II

A Surprising Number of Occurrences in Association With Other Minerals Has Been Discovered —Placer Deposits of Platinum Constitute the Most Important Source—Production of Various Districts

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PLATINUM occurs in graywacke, slate, shale and mica schist. Investigations have been made regarding the platinum content of a graywacke rock near Wenden, Westphalia, Germany, by means of borings. According to Paul Krusch,[46] the graywacke is an elastic rock which consists mainly of quartz and slate, which is bound with a clay cement. It is therefore made up of the fragments of other rocks. The fragments were laid down by water with imperfect separation by specific gravity. The graywacke contains, besides small particles of platinum, small amounts of gold, copper, lead, zinc, silver, nickel, and chromium. In borings in an area of 500 acres, platinum was found in nine different holes. The amounts so far obtained vary from a trace to 33.5 gm. (31 gm. = 1 oz. troy) per ton, and consequently make certain portions of the rock a valuable commercial source of platinum.

It is suggested that the deposit may represent a fossil placer, whose values were originally derived from the breaking down of former platiniferous terranes, such as dunite, peridotite, or serpentine. This is one of the newer discoveries, and the platinum content was not suspected until 1913.

At *American Localities.* The occurrence of platinum has been noted in assays of clay slate containing pyrite, chalcopyrite, and galena, and mica schist from Lancaster County, Pa.[47]; in black Triassic shale from Boyertown, Pa.[48]; and from shales in the Grand Canyon of the Colorado.[49]

Platinum has also been discovered in connection with certain vanadium-bearing coals from Australia, whose ultimate analysis[50] showed 3.8 per cent sulphur and 1.7 per cent ash. Two analyses of the ash from this coal are given in Table V.[51]

TABLE V. ANALYSIS OF ASH FROM AUSTRALIAN COAL

	1 Per Cent.	2 Per Cent.
Vanadium	25.1	2.90
Platinum metals	3.6	0.23
Oxygen with above	44.0	5.10
Sand, earthy matters	27.3	91.77
Totals	100.0	100.00

No. 2 represents an analysis of the ash of the coal in bulk. The No. 1 analysis is equivalent to 14.7 oz. platinum metals and 102.3 oz. vanadium per short ton of coal.

The presence of platinum has been detected in contact metamorphic deposits in association with rhodolite, garnet, biotite and iron sulphides at the top of Mason Mountain, Macon County, N. C.;[52] and with wollastonite on the island of Sumatra.[53]

Platinum has been found, in quantities varying from a trace to one-eighth of an ounce per ton, in shear zones in granite, from Siwash Creek, Tulameen District, B. C.[54]

Occurrences of platinum in association with pyrite and limonite have been reported from Westland, New Zealand,[55] and from the Departments of Charaste and Deux Sevres, France.[56]

IN BULLION, BLISTER COPPER, AND COPPER MATTE

Refiners of bullion and blister copper from the gold and copper ores of the Western United States report the presence of platinum in these substances in amounts varying from 0.3 to 1.8 oz. per 100 lb. of copper. In Table VI, the data of which were compiled by the Ontario Nickel Commission,[57] the presence of platinum and palladium in blister copper from various localities is indicated. The amounts are given as ounces of platinum and palladium per 100 lb. of blister copper:

TABLE VI. PLATINUM AND PALLADIUM IN BLISTER COPPER

	Ounces per 100 Lb. Blister Copper Pt	Pd
Garfield, Utah	0.342	1.183
Steptoe, Nev	1.016	4.402
Omaha, Neb	1.825	6.486
Mountain, Cal	1.320	0.607
Tacoma, Wash	0.710	3.327
Aguascalientes, Mexico	0.416	0.226
Cerro de Pasco, Peru	0.319	0.589
Mount Lyell, Tasmania	0.624	1.374

This table shows an apparently genetic association of platinum and palladium with copper ores, and the advisability of adopting careful methods for their detection. The growth in the practice of electrolytic refining should work in the direction of increasing the supply of the metals of the platinum group from ores of this type. They are so sparsely disseminated in the ores themselves, that only careful analytical work would give a fair idea of their relative amounts.

PLACER DEPOSITS

Up to the present, over 99 per cent of the world's supply of platinum has been derived from placer workings, chiefly in Russia and the United States of Colombia. In these deposits the metal is found entirely as native platinum, which appears to be a natural alloy containing, besides platinum, the associated metals palladium, iridium, osmium, and rhodium, and important amounts of iron. The analyses given in Table VII indicate in general the composition of this mineral.

Sperrylite, the arsenide of platinum, is unknown in placer deposits. Native platinum occurs in these deposits as small flakes, grains, points, pellets, and nuggets, the largest record nugget weighing 252 oz. and coming from the Ural Mountains, in Russia. It is as-

[46] *Min. & Sci. Press*, Vol. 109, Dec. 5, 1914, pp. 879-881.
[47] U. S. Geol. Surv., *Bull.* 193, 1901, p. 59.
[48] Ibid.
[49] Ibid., p. 51.
[50] U. S. Geol. Surv., 17th Ann. Rep., Part III, p. 282.
[51] U. S. Geol. Surv., *Bull.* 193, p. 35, 1901.
[52] Ibid, p. 59.
[53] Trans. Inst. Min. & Met., Vol. 13, 1903-1904.
[54] U. S. Geol. Surv., *Bull.* 193, pp. 49-50, 1901.
[55] *Mineral Industry*, 1913, p. 604.
[56] U. S. Geol. Surv., *Bull.* 193, 1901, p. 65.
[57] Royal Ontario Nickel Commission, Report, 1917, p. 463.

sociated with black sand, consisting of magnetite, chromite, and ilmenite, and with other heavy or hard minerals such as gold, iridosmine, diamond, argentite, cassiterite, and garnet. Chromite and sometimes olivine are characteristic associates.

TABLE VII. COMPOSITION OF NATIVE PLATINUM ALLOYS

	1 Per Cent.	2 Total, Per Cent.	3 Magnetic Portion, Per Cent.	4 Non-magnetic Portion, Per Cent.
Platinum	85.50	72.07	78.43	68.19
Palladium	0.60	0.19	0.09	0.26
Iridium	1.05	1.14	1.04	1.21
Rhodium	1.00	2.57	1.70	3.10
Copper	1.40	3.39	3.89	3.09
Iron	6.75	8.59	9.78	7.87
Gold	0.80	.....	.....	.....
Osmiridium	1.10	10.51	3.77	14.62
Black sand	2.95	1.69	1.27	1.95
Totals	101.15	100.15	99.97	100.29

1 California Crude Platinum Sand (U. S. Geol. Surv. *Bull.* 193, p. 56). 2 to 4 Tulameen Crude Platinum Sand (U. S. Geol. Surv., *Bull.* 193, p. 50).

A study of the various platinum placer fields of the world leads to the conclusion that the original source of most of the placer platinum was in rocks of the dunite, peridotite, or serpentine type, consisting essentially of olivine, chromite, magnetite, serpentine, and some alteration products. No occurrence is known where the source of the metal may be traced to lode deposits of the other types described, which contain sperrylite, accompanied by the sulphides of iron and copper. Despite the rather widespread distribution of rocks of the dunite, peridotite and serpentine type, new placer districts are being discovered infrequently.

Placers are derived by the erosion of materials from the deep secular decay of rocks containing the precious metals, which become concentrated in the gravels. It is most important, therefore, in the search for new deposits, not only to investigate areas containing rocks of the type described, but to pay strictest attention to those which have undergone at least one physiographic cycle, and have hence been subjected to periods of long-continued weathering and erosion.

Short descriptions of the chief platinum placer fields of the world, showing their relation to the physiography and geology of their respective districts, may tend to emphasize these salient features.

Districts in Which the Drainage Basins of the Platiniferous Streams Are Known To Contain Rocks of the Dunite, Peridotite, Serpentine, or Other Olivine-Bearing Types

Ural Mountains, Russia[58]—The platinum fields of Russia are in a comparatively limited area on the eastern and western flanks of the Ural Mountains, almost entirely within the confines of the Government of Perm. The entire area is comprised within a block of country extending less than 400 miles north and south and about 300 miles east and west. There are seven chief producing areas, known as (1) the South Verkhotur, comprising the districts of Nizhne-Tagil, Nizhne Turin, and Verkhne Turin, which is the chief producer; (2) the Perm area, east of the city of Perm, comprising the Iss, Veeva, and Tura river systems, which is the second largest producer; (3) the North Verkhotur area; (4) the Cherdyn area, about 100 miles northwest of the last named; (5) the South Ekaterinburg area, in the neighborhood of the city of Ekaterinburg; (6) the new Nikolae-Pavdinsk and Rastes area, north of the North Verkhotur area; and (7) the drainage system composed of the Vagran, Lobva, Aktai, Talits, and other rivers.

Along the crests of the Urals and near the headwaters of many of the present streams are outcrops of dunite, peridotite, and serpentine, in which have been identified small particles and specks of platinum. The topography of the country is mature, and consequently these platinum-bearing rocks have undergone a great amount of disintegration and decomposition. In this way the precious-metal particles have been released for concentration in the gravels.

Some of the rivers are platiniferous for over 100 miles, and workable deposits have been found at distances of 800 ft. on either side of the present stream courses. The gravels which have been worked vary from a few feet to sixty feet in depth, and the chief platinum recoveries have been obtained from thin paystreaks close to bedrock.

Estimates have been published by various writers of the platinum content of these gravels. According to one authority[59] the product of the Iss River up to 1897 had averaged 60c. per cu.yd. (the platinum being valued at $10.18 per oz.) for an average width of 350 yd., and a depth of 3½ yd. from the grass roots to bedrock. Two dredges working on the Iss River gravels in 1911 recovered 77.7c. per cu.yd. in platinum (the platinum being valued at $37.80 per oz.). The average tenor of the ground worked has been gradually decreasing, as shown in Table VIII, and it has been estimated that unless new productive fields are soon opened up, the rich platinum deposits of the Urals would be exhausted in 8[60] to 12[61] years from 1916, if mined at the pre-war rate.

TABLE VIII. SHOWING DECREASING AVERAGE TENOR OF RUSSIAN PLATINUM PLACERS[62]

Years	Ounces per Cu.Yd. Gravel	Years	Ounces per Cu.Yd. Gravel
1829-1838	0.50	1883-1894	0.10
1838-1850	0.40	1894-1907	0.09
1850-1883	0.33		

Tulameen District, British Columbia, Canada—Platiniferous gravels are found throughout portions of the Tulameen drainage basin, which is about 100 miles directly east of the city of Vancouver. Small rich workings have been located on portions of Granite and Slate creeks, which are tributaries of the Tulameen, and along certain portions of the Tulameen and Similkameen rivers.

The platinum is found in the form of small points and grains, and in small nuggets rarely exceeding half an ounce in weight, associated with black magnetic sand, carrying chromite and olivine. The gravels vary in thickness from a few feet up to 60 or 70 ft., and in the shallower portions the paystreak is concentrated on bedrock.

It has been fairly well demonstrated that the original source of this platinum is in the dunite and pyroxenite rocks of Olivine and Grasshopper mountains,[63] especially where they are rich in chromite. The richest platinum gravels have been found in those stretches of the valleys immediately below the localities in which the dunite or pyroxenite has been tapped by the drainage systems.

[58]U. S. Geol. Surv., *Bull.* 193, 1901, pp. 67-81. *Jour. Ind. & Eng. Chem.*, Vol. 10, No. 11, Nov, 1918, p. 920. *Mineral Industry*, 1916, pp. 594-596. *Min. Jour.*, London, Sept. 20, 1916.

[59]F. W. Horton, *Mineral Industry*, 1911.
[60]*Bull.* A. I. M. E., June, 1919, p. 7.
[61]U. S. Geol. Surv., "Mineral Resources of the U. S.," 1916, p. 16
[62]*Mineral Industry*, 1916, p. 596.
[63]U. S. Geol. Surv., *Bull.* 193, 1901.

A great deal of the shallower ground of the narrow stream valleys has been fairly well worked out during the last thirty years, by small hand operations; but there are still great stretches of almost virgin ground in the valley flats of the larger streams, which, judging from the results of preliminary investigations by the Canadian government in 1918, may supply considerable amounts of the white metal.

The region lacks the condition of mature topography, and consequent deep secular decay, which, if present, would no doubt make it one of the world's important platinum producers. Nevertheless, sufficient platinum has been taken out of the Tulameen district, particularly during the last fifteen years of the last century, as shown in Table IX, to maintain for it the position of premier platinum producer of North America.

TABLE IX. PLATINUM PRODUCTION OF THE TULAMEEN DISTRICT [64]

Year	Ounces	Year	Ounces
1887	2000	1894	160
1888	1500	1895	633
1889	1000	1896	266
1890	1100	1897	125
1891	2000	1898	100
1892	500	1899	137
1893	257		

Ronda Mountains, Spain[65]—Platinum-bearing sands and gravels have been recently found to occur in the river systems in the region of the Ronda Mountains, Province of Malaga, southern Spain. The area comprises twelve or fourteen river systems, and the deposits are loose peridotite sand found in the river beds at depths of ten to fifteen meters. The platinum is associated with magnetite, chromite, ilmenite, gold, zircon, and brookite. The topography of the area is youthful, and the platinum-bearing streams flow through steep-walled, narrow valleys.

After the announcement of the discovery, the Spanish government took possession of the ground, prohibited prospecting in the vicinity, and arranged for financing the necessary drilling and testing to determine the extent and value of the deposits. Reports indicate that this work has been completed on the rivers Verde and Quadaiza, and that platinum has been found to be present in reasonable quantity. One report states that the platinum content of part of the Verde bed varies between 0.002 and 0.006 oz. per cu.yd. There is a gradation from coarse to fine gravel from surface to bedrock, and though there is slightly more platinum near bedrock than in the upper part of the gravels, there is no sharply marked pay streak.

The geology of the area is not essentially different from that of the Ural Mountains, Russia, or the Tulameen District, B. C. It lacks, however, the mature topography of the Russian districts. The rock system of the Ronda Mountains has been the subject of careful study, and it has been found to consist in part of peridotite, with central cores of dunite containing masses of chromite, through which minute particles of platinum are disseminated. This, no doubt, is the mother lode of the placers.

New South Wales, Australia—The most important of all the Australian occurrences of platinum are at Fifield and Platina, districts about a mile and a half apart and about fifty-four miles west of Parks, in New South Wales. The associated rocks, principally slates, are the same in both localities, and the platinum appears in a gravelly wash, together with osmiridium and gold. The beach sand deposits of the northeast coast of New South Wales furnish platinum just as do those of the southwest coast of Queensland. In these black sands, platinum, osmiridium, gold, cassiterite, and monazite are found in very fine grains, associated with chromite, magnetite, ilmenite, garnet, and zircon. Though the sources of all these minerals are not easily determinable, the platinum and osmiridium are believed to have come from the serpentine area forming part of the western edge of the Clarence Coal measures.[66]

The total production of New South Wales up to 1911 was 11,500 oz. of crude platinum. Most of the material has come from Fifield, where the shafts to bedrock are from 50 to 60 ft. deep, and the thin paystreak, 6 in. to 13 in. thick, on the bedrock yields one part of gold to seven parts of platinum.[67]

Borneo—Platinum is found with gold in the gravels of certain streams in the southeast of Borneo, in the Tanath-Laut region. The streams rise in the Bobaris Mountains, which are formed of crystalline schists and gneisses that have been intruded by basic dikes ranging from dunite with chromite to olivine gabbro. These rocks have been altered to serpentine. In the gravels which have been formed from these rocks, olivine, chromite and platinum are found with gold. The locality has yielded at least a few thousand ounces.[68]

California—The principal occurrences of platinum in the United States are in California. Here a small amount of crude platinum occurs in the principal placer mines of the gold belt of the Sierra Nevada, but in no place is the metal so abundant that the deposit can be worked for platinum alone. The source of the metal is undoubtedly in the serpentine and peridotite or pyroxenite, which occur as intrusive masses throughout the gold belt. In many cases, silvery white scales of iridosmine are more common than the platinum itself. Little or no platinum was recovered until the beginning of dredging operations on a large scale along the foothills of the mountains.[69] The most productive counties are Trinity, Siskiyou, Calaveras, Yuba, Butte, Humboldt, Merced, and Del Norte.

Districts in Which the Mother Lode Rocks of the Platinum Are Not Definitely Known To Occur

United States of Colombia, South America—The gold-platinum alluvial deposits cover an area of more than 5,000 square miles, which lies west of the central ridge of the Colombian Andes, in the Atrato and San Juan drainage basins, and extends south of the mouth of San Juan River along the coast to Mira River. The richest deposits and those most worked in the past are near the headwaters of San Juan River, principally on the Condoto River. The platinum is found in greatest abundance in the present stream channels, but it is also found in conglomerates of Tertiary age. Platinum is found in the streams only where the conglomerate has been eroded. Stream beds above the areas underlain by that formation are barren. The stream deposits are reconcentrations from the older gravels. The Tertiary conglomerate is composed of rounded boulders of basic rocks, among which diabase, melaphyre, peridotite, and dunite have been recognized.

[64] Geol. Surv. Can., "Memoir 26," 1913, p. 143.
[65] *Mineral Industry*, 1916, p. 596; U. S. Geol. Surv., "Mineral Resources of the U. S.," 1915, p. 147, and 1916, p. 16; *Mineral Industry*, 1915, p. 579.
[66] *Mineral Industry*, 1917, p. 543.
[67] U. S. Geol. Surv., "Mineral Resources of the U. S.," 1911, p. 14.
[68] U. S. Geol. Surv., "Mineral Resources of the U. S.," 1916, p. 12.
[69] U. S. Geol. Surv., "Mineral Resources of the U. S," 1911-1917.

In the gravels of the San Juan drainage basin there are about equal quantities of platinum and gold, but in the Atrato basin platinum constitutes approximately 15 per cent of the value, the remainder being gold. What appears to be a conservative estimate gives a total of 336,000,000 cu.yd. of gravel that can be considered as reserves, with 68,000,000 cu.yd. as proved ground, capable of producing at a profit under present working conditions. It is well understood that prospecting in the Choco is difficult, and these estimate reserves may be revised in the light of future work.[70] Chromite is present in the sand with the platinum which points to a peridotite as its original home.[71]

A promising new source of platinum was discovered in Colombia in 1917. This was in the Cacceres district, in the basin between the Cauca and Nechi rivers, in the department of Antioquia. The tract covers 12,096 acres, extending for 14¼ miles along the Caceri River, principally on the north side, where it reaches back for about a mile and a quarter. On the south side the width is about 300 ft. The loose gravelly soil would make extraction easy, and the sands extend downward to a depth of 25 ft.[72]

California and Oregon Beaches—The presence of platinum is characteristic of the beach sands along the Pacific Coast from San Bernardino County northward to the mouth of the Columbia. The richest beaches are in Humboldt and Del Norte counties, Cal., and in Coos County, Ore. Bullard, in Coos County, and Port Orford, in Curry County, have proved, perhaps, the richest beaches. It is difficult to give the percentage of platinum occurring in the sand, as the fine scales are concentrated into thin paystreaks on the beach.[73]

North Saskatchewan and Peace Rivers, Canada—Gold and platinum-bearing gravels have been found in the bars and benches of the North Saskatchewan River, in the vicinity of Edmonton, Alberta, and also of the Peace River and its tributaries, the Finlay, Omineca and Ingenca, in northeastern British Columbia. The platinum is usually in the form of fine flakes and grains, associated with gold, magnetite, chromite, and garnet. No mining operations of any account have yet been carried on in these areas.

The original source of the platinum is unknown. No basic rocks of the peridotite or olivine-chromite-bearing type have been identified anywhere in the vicinities of these gravels. It is possible, however, that the precious-metal particles might exist in the form of fossil placers in the sediments of the Rocky Mountains, where they were deposited in earlier geologic eras. The rivers are now eroding these sediments and may be concentrating therefrom such precious metal particles as they contain.

Cariboo District, British Columbia, Canada—Platinum is known to occur in certain of the river systems of the Cariboo districts, chiefly in association with the gold-bearing placers, and along the Quesnel River. Owing to the small amount of geological investigation that has been carried on in this region, it is not known whether or not basic rocks of the olivine-bearing type occur in the neighborhood.

Inferences from the study of the foregoing classified descriptions of platinum deposits should direct attention to the following types of rocks and orebodies, as possible new sources of the platinum metals:

Lode Deposits—(1) Basic intrusive rocks, of dark green to black color, consisting chiefly of pyroxene, hornblende, basic feldspar, or olivine, and containing appreciable amounts of chalcopyrite, pyrrhotite, pyrite, bornite, and covellite. Preference should be given to those areas in which such rocks occur as the smaller intrusive masses, like sills, dikes, and sheets. (2) Copper-gold veins, especially if they contain such minerals as bournonite, tetrahedrite (gray copper), chalcopyrite, arsenopyrite, and covellite. (3) Nickeliferous orebodies in general, especially those of the magmatic segregation type. (4) Rocks of the dunite, peridotite, and serpentine types, especially where they are known to contain chromite in disseminated or massive form. (5) Sedimentary beds, of the fragmental type, which might be fossil placers. (6) Bituminous deposits the ash of which carries appreciable amounts of vanadium.

Placer Deposits—(1) Gravels, with which are associated particles of chromite and olivine. (2) Gravels, found in watercourses which drain, or drained at the time of their formation, areas containing rocks of the olivine-bearing type, such as dunite, peridotite, and serpentine, in which chromite occurs. (3) Gravels, in areas of such basic rocks, which have passed through at least one physiographic cycle, during which mature topography has developed, resulting in the deep decay of rock and the consequent release of the precious metal particles. The richest deposits of the world are found, as stated, in areas in which these types of rock occur, and where the valleys are broad and mature, and the river gradients low.

[70]U. S. Geol. Surv., "Mineral Resources of the U. S.," 1915, pp. 145-146.
[71]U. S. Geol. Surv., "Mineral Resources of the U. S.," 1911, p. 15.
[72]*Mineral Industry*, 1917, p. 546.
[73]U. S. Geol. Surv., "Mineral Resources of the U. S.," 1911, p. 12.

Eight-Hour Day in Metal and Mining Industries in France*

Representatives of the metallurgical, mining, mechanical construction, electrical and manufacturing employers' union, and of the Federation of Metal Workers of France have agreed upon the following articles:

There shall be an eight-hour day in all these industries. The employees will adapt themselves to the modern development in machinery and to reasonable methods of work in order that production may early resume its former status and attain the proportions necessary to the general welfare. The employers recognize that in order to maintain and develop production it is expedient to establish piece rates, premiums, and bonuses, and they agree to guarantee a wage based upon production under normal conditions; and if, by reason of the activity and efforts of the employees, production exceeds this base, the employees are assured that their intensified production shall not be considered as a reason for a reduction of wages.

The reduction of the hours of labor to eight per day shall not work a decrease in wages. Employees working by the hour shall have compensating increase of hour rates, but changes in piece rates shall be demanded only when such rates, without change in equipment, do not afford, with normal effort, an opportunity to earn the usual wages. Foreign workmen having equal occupational skill as French workmen may be employed when industrial conditions demand it and shall receive equal wages and remunerations.

*From July issue of *Monthly Labor Review* of U. S. Department of Labor; translated from *La République Française*, Paris, April 19, 1919.

A New South Wales Lead Smeltery

The Cockle Creek Silver-Lead Works of the Sulphide Corporation, Ltd., Treat Complex Ores By Roasting and Blast-Furnace Smelting, Followed by Refining of the Base Bullion—Sulphuric Acid Also Made

A COMPLETE description of the silver-lead smelting works of the Sulphide Corporation, Ltd., at Cockle Creek, New South Wales, was recently published[1] in Australia. Through not as large or as modern in all respects as some other plants, the company has prospered in the face of many difficulties. The works are of interest from the standpoint of the complexity of ores treated, which include lead, antimony, arsenic, silver, gold, copper, bismuth, and zinc, and also because of the diversity of the products. In addition to the metals, there is produced in a year 19,000 tons of chamber sulphuric acid, from which is made 25,000 to 30,000 tons of superphosphate, together with smaller quantities of coal gas, fuel oil, sulphate of ammonia, pitch, nitric acid, and other byproducts.

ROASTING

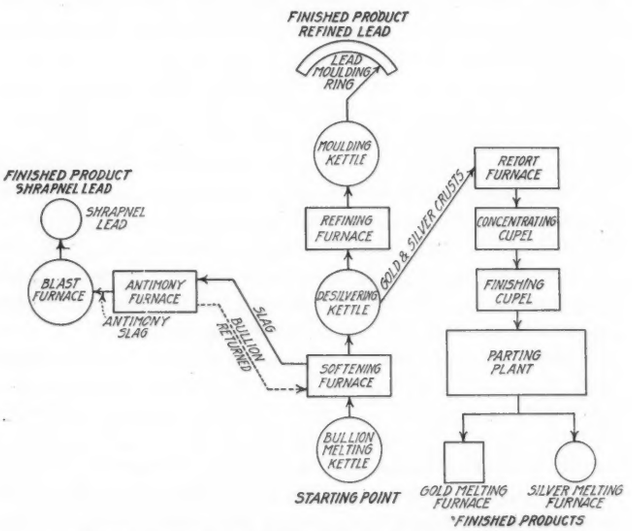
Most of the ore treated comes from the company's Broken Hill mines, although custom ore of the most complex character is accepted from outside sources. Ores containing over 3 per cent sulphur are crushed by jaw crushers and Krupp mills to pass a ¼-in. screen. Should the ore or concentrates be high in sulphur, a preliminary roast is given in gas-fired Godfrey furnaces to bring the sulphur down to about 10 per cent, and also to agglomerate the fine particles for subsequent treatment in the Huntington-Heberlein pots. A typical charge to the roasting furnaces would contain: Pb, 50 per cent; SiO_2, 7; FeO, 7.5; CaO, 6; MnO, 2.3; ZnO, 10; S, 15 per cent.

There are twenty-four cast-iron H.-H. pots of elliptical form, hung on hollow trunnions. Each has a capacity of five tons, the charge resting on a horizontal perforated plate set 6 in. from the bottom of the pot. The 10 to 12 oz. air blast passes through the hollow trunnion, down a pipe outside of the pot, and thence into the wind-box. The ore charged is red hot, as it comes from the Godfrey furnaces, so that no fuel is needed, roasting throughout the charge beginning as soon as the air is turned on. After six to eight hours the pot is turned over, and the sintered mass dumped out and cooled by a water spray, and then broken up into 6-in. lumps.

SMELTING

The H.-H. product, along with about one-third of its weight of reverts and fluxes, after proper bedding and mixing, is charged, along with coke, to the blast furnaces, of which there are three. No. 1 has a crucible area of 49.5 sq.ft., measuring 11 ft. 6 in. by 5 ft. at the tuyères. Blast enters through thirteen 3-in. tuyères at 60-oz. pressure. Working normally, this furnace is capable of treating 300 tons of charge per day, exclusive of returned slag and coke, with an output of 100 tons of lead.

Tapped slag flows into a cast-iron forehearth mounted on wheels, where the lead and matte is caught, the slag overflowing into a 3-ton cast-iron pot, from which it is poured on the dump, the sculls being re-smelted. Forehearths are replaced several times a shift, the full ones being taken to the matte shed, where they are drained of matte and lead, and the shells knocked out. Any slag tapped out of these forehearths, together with the shell, is returned to the blast furnace. Nos. 2 and 3 furnaces are similar to No. 1, but are smaller. On account of the large variety of ores treated, the slags are of varying composition. As an illustration, however, the following analysis is given: Pb, 0.7 per cent; FeO, 36; MnO, 1.6; CaO, 17; SiO_2, 24; ZnO, 12 per cent.



FLOW SHEET AT COCKLE CREEK REFINERY

The lead, tapped from the forehearth in small cast-iron pots, is run across to the drossing furnace. This is a small reverberatory of about seven tons' capacity, from which is obtained lead bullion (carrying most of the gold and silver) and dross. The dross, on being removed from the top of the lead, is still fairly "wet," and is transferred to a liquating furnace, where most of the lead is sweated out and returned to the drossing furnace, the more or less "dry" dross being re-smelted in the blast furnaces after a sufficient amount has accumulated. Lead matte, caught in the forehearths, is cast, cooled and ground in the Krupp mills for subsequent incorporation in the H.-H. charge. The lead from the drossing furnace is cast into bars of about 85 lb. each and sent to the refinery.

REFINING

The flow sheet of the refinery is shown in the accompanying cut. The bars of base bullion are first charged into the 50-ton copper-drossing kettle, where they are melted at a low temperature and the copper dross is skimmed. This dross is treated in a small liquating furnace, the liquated bullion being returned to the refinery, and the copper dross going to the copper smelters. The molten metal in the kettle is then transferred

[1] Proceedings of the Australasian Institute of Mining Engineers, Melbourne, No. 31, pp. 1-39; joint authorship.

to the antimony softener by means of a direct-coupled electrically driven Rumsey centrifugal pump. This type of pump is an innovation in Australian refinery practice. It is permanently fixed in a frame which rests on the circumference of the kettle, and immersed to the full depth of the latter. Forty tons can be pumped in twenty minutes.

The antimony softener is of the usual reverberatory type, lined with magnesite brick at the litharge level. An oxidizing atmosphere is maintained, the resultant litharge, carrying the antimony and arsenic, being constantly run off. After eight to twelve hours, which is required to remove the antimony and arsenic, the "clean" metal is tapped into one of two desilverizing pans and the gold and silver separated by the Parkes process.

The skimmed litharge is mixed with fine coal to reduce the metal, and is charged intermittently to one of the blast furnaces reserved for the purpose. The slag from this furnace carries the antimony and arsenic. After further treatment, the antimony is recovered in a final product mixed with lead, which is sold as shrapnel lead. Two zinckings are made, regardless of the gold and silver content. The first zinc alloy is pressed off by the Howard press, which is worked by pneumatic pressure, the second zincking being skimmed by hand. The desilverized lead is then syphoned to the usual jacketed type of reverberatory, where the remaining zinc and antimony are skimmed by hand, the refined lead being cast for shipment.

The pressed silver-zinc alloy is charged to retort furnaces for the volatilization of the zinc. There is one four-bottle regenerative gas-fired furnace, and there are two single-bottle oil-fired tilting furnaces. The latter are fired with a heavy distillate made from coal tar, which has proved efficient. The life of the retorts in the tilting furnaces is good, and the furnaces are simple to operate. The retorted bullion, assaying from 2,000 to 2,500 oz. Ag per ton, passes to the concentrating cupels, where the lead passes off as litharge and the concentration is brought up to 16,000 oz. of silver and gold per ton. Further cupeling results in a pure doré, which is molded into anodes of approximately 100 oz. for the parting operation.

The electrolytic parting plant is furnished with thirty-six earthenware cells of the Balbach type. Each cell contains two wooden paraffined cradles with inner frames holding the 10-oz. linen duck cloths. The anodes lie horizontally on the cloths and are just immersed in the electrolyte. This solution is essentially silver nitrate, containing a considerable quantity of copper nitrate, with some lead nitrate and about three grams per liter of free nitric acid. The silver is deposited on carbon cathodes lying on the bottom of the cell, which are raked forward periodically, drained, washed, and dried. When comparatively dry, the silver is put in very light calico bags, melted, and run into bars of 1,050 oz. This silver is remarkably pure, assaying 999.9 fine, and carrying not more than 0.2 oz. of gold per ton. The gold remains as a sludge on the cloths. This is dried, inquarted with three times its weight of silver, and re-parted to give a denser product. Any remaining silver is dissolved by boiling with concentrated sulphuric acid, the gold washed and melted and cast into 600-oz. bars.

Two separate units for the manufacture of sulphuric acid are in operation, one utilizing the gases from pyritic ores roasted for the purpose in Herreshoff furnaces, and the other utilizing the gases from the Huntington-Heberlein pots. The latter presents several unusual features. The plant consists of four chambers and seven towers, including two Glovers, two inter-chamber towers, one regulator, and two Gay-Lussacs.

The Glover towers do not function as concentrators, on account of the low temperature of the entering gases, but, by observing several conditions, they serve as efficient denitrators. The chief function of the inter-chamber towers is to keep alive rapid chemical action by thoroughly mixing the gases, and so minimizing the retarding effect of the CO_2 present as an impurity in the gas. The regulator is placed between the last chamber and the Gay-Lussacs. Its chief function is to prevent any SO_2 entering the Gay-Lussacs on account of sudden variations in the gas supply. The Gay-Lussac towers absorb the nitrogen oxides and operate in series. The chambers are built narrow and high to keep the gas moving rapidly. Their dimensions are as follows: Two chambers in parallel, each 30 in. high, 20 in. wide and 80 in. long; following chamber, 30 in. high, 20 in. wide and 80 in. long; last chamber, 30 in. high, 20 in. wide and 40 in. long.

The gases are drawn from the H.-H. plant through the dust chambers and Glover tower by the suction of a lead fan. The casing and impellers of this fan are made of antimonial lead, the impellers being mounted on a 3-in. steel shaft covered with lead sleeves on that part of its length exposed to the acid gases.

British Imports and Exports

The following figures of British metal and ore imports and exports for June, 1919, and the first six months of the year have been reported by the Board of Trade, and published in the *Ironmonger* of July 19, 1919.

BRITISH IMPORTS
(In long tons)

	June, 1919	Jan.-June, 1919
Iron ore, manganiferous	7,527	88,154
Iron ore, other sorts	316,156	2,467,730
Pig iron, basic	848	65,468
Pig iron, forge and foundry	1,759	7,326
Pig iron, hematite	3,115	11,549
Pig iron, other grades	.....	1,964
Steel blooms, etc	2,828	6,417
Iron bars, angles and rods	1,905	9,263
Copper ore	417	8,760
Copper, regulus	140	5,895
Manganese ore	15,380	194,601
Pyrites of iron and copper	14,064	136,005
Copper, unwrought and part wrought	5,002	68,861
Lead, pig and sheet	22,773	152,258
Tin ore	2,852	20,774
Tin, blocks, ingots, slabs	1,467	8,585
Zinc, crude	4,977	54,905
Zinc, manufactured	321	1,184

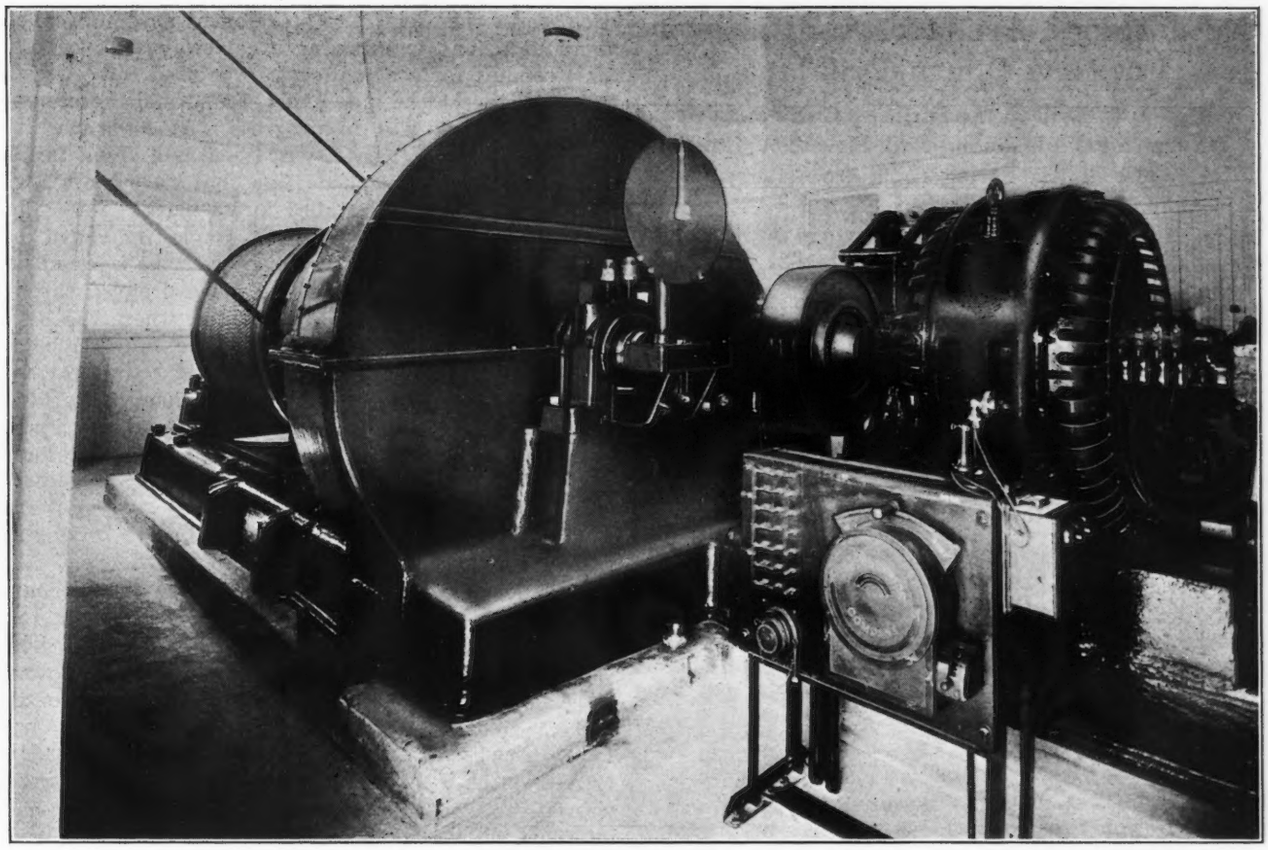
BRITISH EXPORTS
(In long tons)

	June, 1919	Jan.-June, 1919
Pig iron, basic	25	155
Pig iron, forge and foundry	12,849	74,762
Pig iron, hematite	9,955	41,981
Pig iron, other grades	4,987	37,596
Iron bars, rods, shapes, etc	3,963	17,875
Iron ore	105	660
Copper ingots, etc	564	1,950
Lead, pigs, etc	1,073	6,016
Tin, unwrought	689	4,891
Zinc	334	1,111

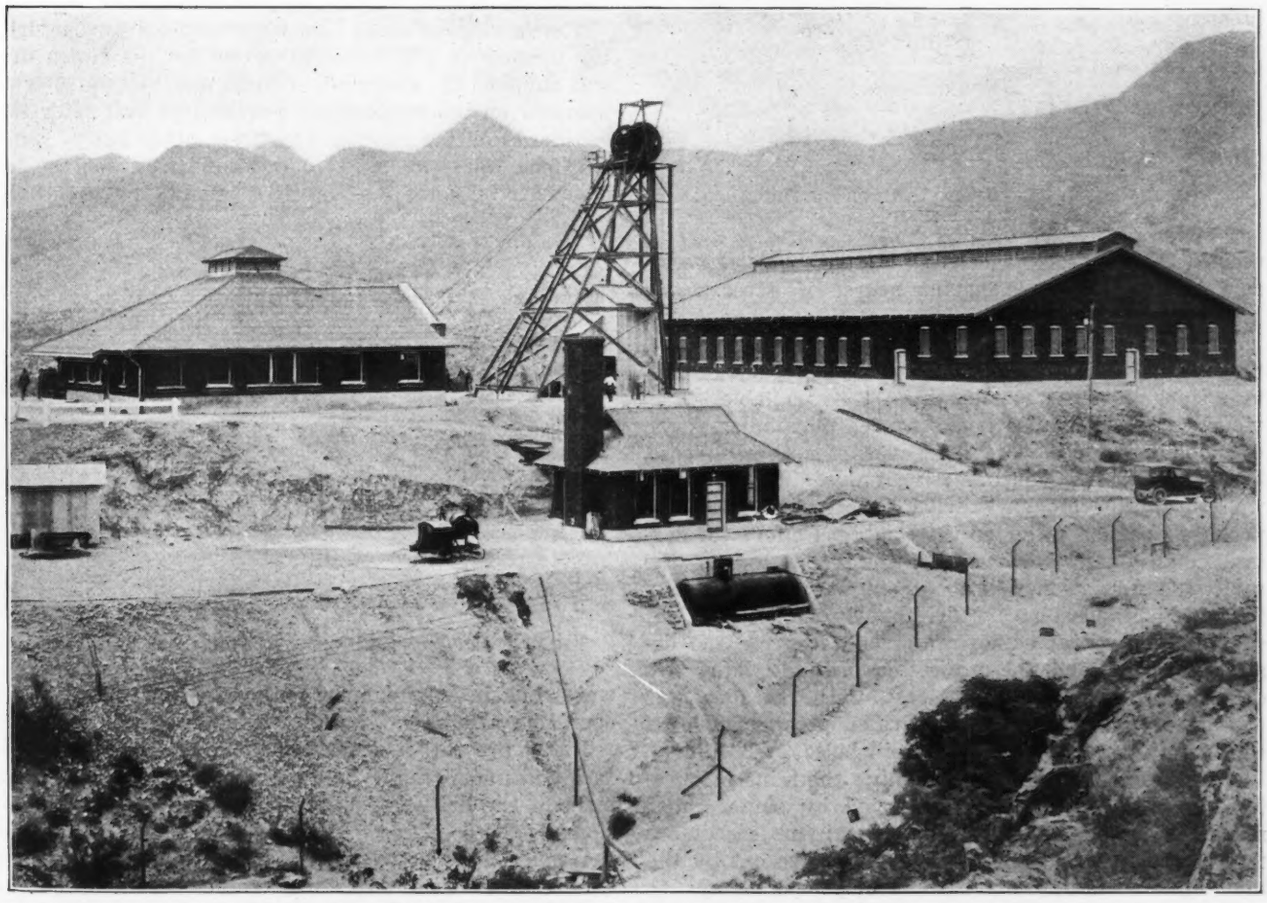
Directors' Report of the Lobitos Oil Fields, Ltd., shows that production amounted to 85,213 tons for 1918, compared with 91,548 tons in 1917. The net profit, after deduction of all charges and depreciation, amounts to £74,587, making a total credit to profit-and-loss account of £109,296. A dividend of 15 per cent less income tax is recommended.

Ray Consolidated Copper Co.

NO. 4 SHAFT AT RAY CONSOLIDATED, USED EXCLUSIVELY FOR HOISTING AND LOWERING MEN AND CARRYING POWER LINES



ELEVATOR AT NO. 4 SHAFT, USED FOR HOISTING AND LOWERING MEN. RAY CONSOLIDATED COPPER CO., RAY, ARIZ.



GENERAL VIEW OF SURFACE EQUIPMENT NO. 4 SHAFT, RAY CONSOLIDATED, SHOWING CHANGE HOUSE AT RIGHT

Old Diamond-Drill Hole as Cableway For New Churn-Drill Hole

From a Churn Drill on the Surface a Cable Is Lowered Through an Old Diamond-Drill Hole to Workings, Where Bit and String Tools Are Attached

BY ROY H. POSTON
St. Francois, Mo.

AT ONE property in the southeast Missouri lead district, a complete system of drinking-water lines is maintained separately from the main mine drainage and fire system, for the plant employees and the adjoining towns. The original system drew its water from several small underground diamond-drill holes scattered through the various mine stopes, the water from these several holes being piped to a central drinking-water pump. Increased demands for more water from the growing towns, and mine development that

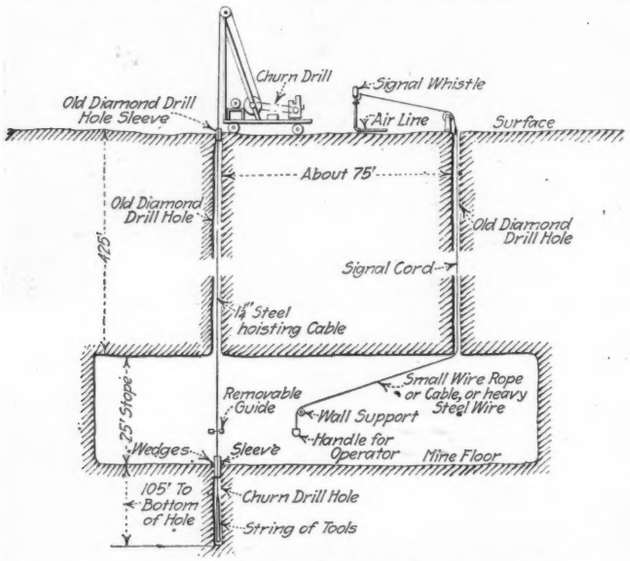


FIG. 1. GENERAL ARRANGEMENT OF DRILLING EQUIPMENT

seemed to diminish the existing supply, made it necessary to find a more dependable source of water.

As it was an established fact that the sandstone formation underlying all the mine workings carried the necessary water supply, it was only necessary to provide suitable wells to make this water available. Previous experience having demonstrated that underground diamond-drill holes were inadequate for this purpose, because of their small diameter, it was decided to sink wells by means of churn drills, thus making one hole produce as much water as the combined efforts of several small ones. However, as the beginning of the sandstone formation was about 400 ft. below the surface, this proposal meant drilling through 400 ft. of ground that contained no available water for the desired purpose, and the project accordingly hung fire on account of the excessive cost, until the idea was evolved of using a previously drilled prospect hole as a cableway for the new churn-drill hole.

All the country over and adjoining the mine in question had been previously prospected by surface diamond drills, and as these holes were in no case more than 100 ft. apart, and practically all were cut by the the mine workings it was only necessary to select two holes near the underground pumping station, clean them out, and start operations. Two holes were used, one to serve as a cableway and the other as a conduit for a signal cord to be used for conveying signals between the men underground and those on top while the work was in progress. At first a whistle cord, as shown in Fig. 1, was tried as a signalling device, but later a telephone line that gave more satisfactory service was installed in its place.

The method of operation was simple, the churn drill being set up in the usual manner over the selected hole on the surface and the drilling cable dropped through the hole to the mine workings below, where the bit or "string of tools" was attached. The mine stope selected for the churn-drill hole had, of course, to have sufficient head-room to permit the changing of bits, bailing out of sludge, and other necessary work, and was examined carefully as to "loose" roof, every morning before work was started. A "sleeve," or piece of pipe a little larger in diameter than the gage of the bit was properly set in place to guide the bit in starting and to maintain its true course downward.

No unusual difficulty was encountered in the course of putting the hole down in the usual manner to a depth of 105 ft., where it was considered bottomed. It was feared that the steel rope attached to the bit would wear rapidly because of its rubbing on the side of the diamond-drill hole, and to counteract this, the rope was well greased with a heavy cup grease before being lowered into the hole, and therafter a gallon of black oil was poured into the hole from the surface at eight-hour intervals, while drilling. Either as a result of this treatment or because of the soft limestone rock encountered, the rope was subjected to no extraordinary wear during the entire drilling.

The services of three men were required for the drilling operations. The motive power for the churn drill was supplied by a gasoline engine, and consequently an operator on the surface was required to look after this engine, to oil the rope, and perform other duties, while two men were employed underground to guide the bit, change bits, and bail out the sludge. Several holes

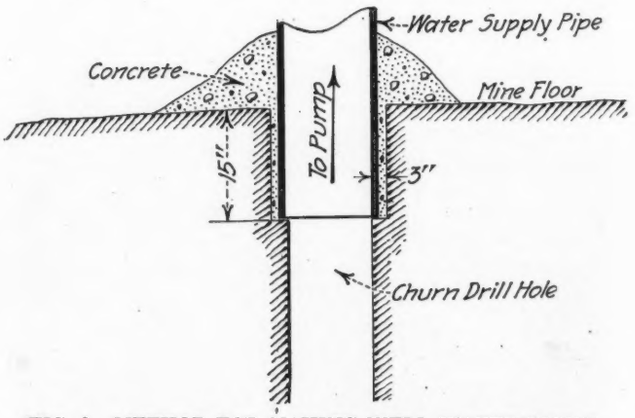


FIG. 2. METHOD FOR MAKING WELL WATER-TIGHT

were sunk in this manner, without serious problems of operation arising.

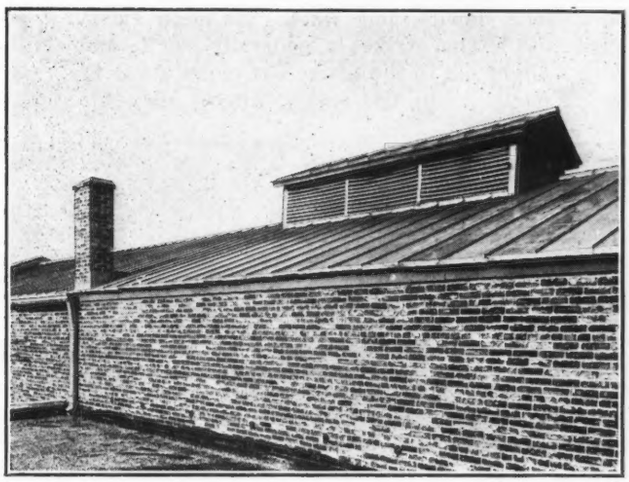
Fig. 1 presents a general sectional view of both surface and underground, and shows the general arrangement of the drilling equipment and the existing conditions at both places. Fig. 2 shows how the top of the well is made water-tight, when finished, in such a manner that no water may get either in or out at the collar of the well.

Zinc for Roofing

Used for That Purpose on New Plant of Central Foundry Co. at Joplin, Mo.—Other New Uses for Zinc

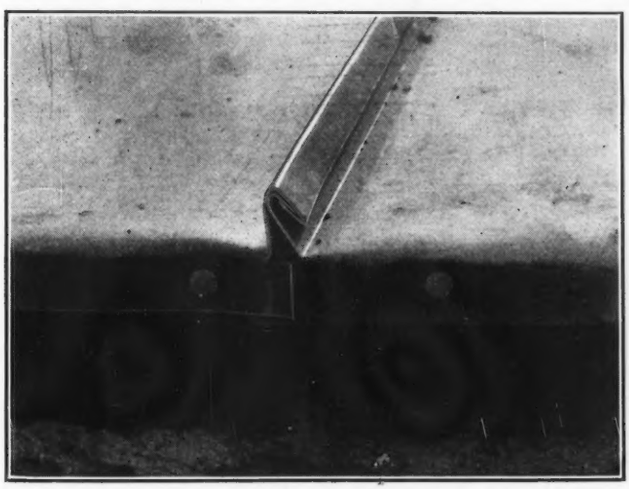
JOPLIN CORRESPONDENCE

THE Central Foundry Co. of Webb City, Mo., lost its plant by fire about a year ago. A site was secured in Joplin, and a new plant completed early this summer. H. T. Hornsby, president of the company, determined to try zinc for roofing, and decided upon a roof of sheet zinc, with standing seams to allow for the



ZINC ROOF ON CENTRAL FOUNDRY AT JOPLIN, MO.

expansion and contraction of the metal. The seams are about one inch in height, and the sheets are approximately 12 ft. long and 18 in. wide. The new roof was constructed by local tinsmiths, who had no previous experience in working with zinc.



STANDING SEAM THAT PERMITS CONTRACTION AND EXPANSION OF ZINC SHEETS

The seams are about one inch in height, and the sheets are approximately 12 ft. long and 18 in. wide.

It is now planned to put a new roof of ornamental zinc shingles on a church at Commerce, Okla., the money having been raised for the purpose. The shingles, it is expected, will be purchased from a firm at Nevada, Mo. A zinc-products factory has been established at Quapaw, Okla., which will manufacture numerous household articles of zinc. One firm has made an offer of $50 for the first zinc washtub, and another an offer of $5 for the first zinc cup.

The Oklahoma-Kansas-Missouri branch of the American Zinc Institute is planning to arrange an exhibit of different articles now made of zinc with the idea of loaning it to county fairs and other public expositions.

Roosevelt Memorials Planned

Monument To Be Erected in Washington and Park Created in Oyster Bay—Popular Subscriptions To Finance the Project

THE ROOSEVELT MEMORIAL ASSOCIATION has been organized by a number of friends of the late Colonel Roosevelt, and a campaign for subscriptions to a fund of at least $10,000,000 will be prosecuted during the week of Oct. 20 to 27 of this year. These dates have been selected because Oct. 27 was Colonel Roosevelt's birthday.

The object of raising the fund is to erect in Washington, seat of the Government and scene of Colonel Roosevelt's most important labor for the public good, a national memorial monument; and to create at Oyster Bay, his home for so many years, a park which may ultimately include his estate of Sagamore Hill, to be preserved in the same manner that Mount Vernon and the Lincoln home at Springfield have been.

Of the thousands of suggestions for fitting memorials that came from Roosevelt's friends and admirers, it seemed that these two forms were most nearly significant of his life and personality. Washington, the capital of the country, where Roosevelt had spent so many of his years in work that left its impress on the history of the nation, could be left out of no plan for a permanent memorial to him.

Equally fitting for a memorial to Roosevelt as a man and as a lover of nature is the scene of his ideally happy home life at Oyster Bay. In his lifetime he loved it all—its woods and fields, the shores of Long Island Sound, the flowers and the birds. He loved the outdoor life and he wanted others to love and share and benefit by it. During his lifetime in fact he endeavored to obtain an outdoor park for his friends and neighbors at Oyster Bay, but did not live to see the accomplishment of his wish. With his passing, a wider significance will be given to this cherished aim. The creation of a park will give his fellow-citizens opportunity for rest and recreation and upbuilding of mind and body; the inclusion of his home, with its fields and woodlands, its furnishings, its library and trophies and gifts from all over the world will make it particularly a spot associated with his memory and a Mecca for all Americans.

A memorial to Colonel Roosevelt will not so much honor him as honor America and the citizens who raise it to him. Checks may be sent to Albert H. Wiggin, Treasurer, Roosevelt Memorial Association, 1 Madison Ave., New York City.

Oil-Shale Refinery Established at Elko, Nev.

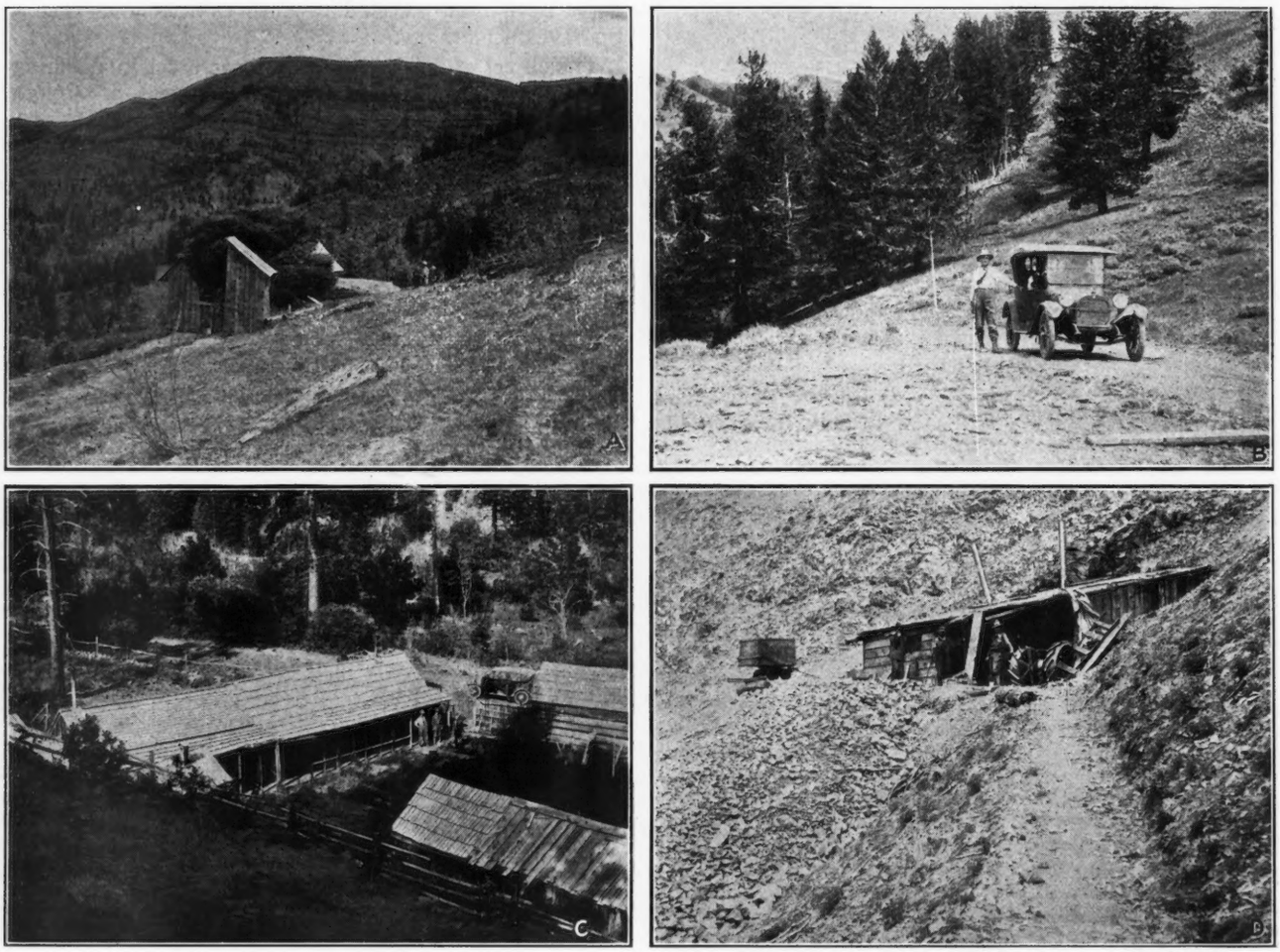
In co-operation with the Southern Pacific R.R. Co., the Bureau of Mines has established, at a cost of $40,000, an oil-shale refinery for the purpose of carrying on experimental work on a commercial scale with oil shale from different deposits of the West. The plant has a capacity of forty tons per day.

The I. X. L. Copper Prospect

Property in Heath Mining District, in Adams County, Idaho, Described as a Possible "Porphyry Copper" Deposit, Though Evidence of Zone of Surface Oxidation Is Lacking—Natural Features of District Favorable To Operation

By Robert N. Bell
State Mine Inspector of Idaho, Boise, Idaho

TO DATE, Idaho has been of little importance as a copper producer, but nevertheless it presents certain geological advantages that favor the discovery of copper deposits of merit. One of the most interesting copper developments recently made is that of the I. X. L. prospect, in the Heath mining district, in Adams County, Idaho. This property, which is owned by the Idaho Copper Mines Co., is situated seventy-five miles north of Boise, ten miles from the Huntington branch of the Oregon Short Line, and sixteen miles over an easy grade from the Pacific & Idaho Northern Ry., which branches off from the Short Line at Weiser. The I. X. L. property now suggests the possibility of its turning out to be a large disseminated "porphyry copper" deposit.



VIEWS OF I. X. L. PROPERTY IN HEATH MINING DISTRICT, ADAMS COUNTY, IDAHO

(A) Property from Upper Camp Showing Nearly Horizontal Lava Flows on Monzonite on Northeast Rim of Basin. (B) Saddle in South Rim of Basin Through Which Lower Zone Passes Upper Zone. Saddle Situated Beyond Trees. (C) Lower Camp of I. X. L. Property. (D) Dump and Portal of 750-Ft. Crosscut Tunnel in Upper Zone

The Heath mining district embraces the flat top circular summit and adjacent slopes of Cudday Mountain, which has a maximum elevation of 8,000 ft. The central boss of this mountain is probably about five miles in diameter, and consists of a formation resembling quartz hornblende diorite, but which has been classified as monzonite. The strike is generally north and south with a slight dip to the east. The mountain is bordered on the north, south, and east by almost horizontal flows of Columbia basalt lava. Near the crest, an old erosion channel is filled with several hundred feet of undisturbed flows of the same formation which are unmineralized.

The western exposure of Cudday Mountain toward Snake River Canyon shows a range 6,300 ft. in elevation above the river at the highest point. A cross section of the mountain, beginning a mile below the summit, and running toward the river, shows, besides the

monzonite, large bodies of old greenstone porphyry, with included reefs of marbleized limestone, accompanied by contact metamorphic minerals and characteristic sulphide ore lenses. On the lower slopes are found extensive exposures of slate, shale, and limestone reefs, with dikes and intrusions of andesite, basalt, and other igneous rocks. The sediments range in age from Carboniferous to Jura Triassic.

Two Well-Mineralized Zones on Property

The I. X. L. group, embracing about sixty lode claims, covers a large part of a steeply inclined, circular erosion basin, two miles in diameter and facing west. The middle slopes are well timbered, and several low rib-like ridges divide the tributaries of Brownlee Creek, which meet at the lower west end of the group. Traversing the property along its eastern border, near the crest of the mountain, there is a well-defined zone, 400 ft. wide and nearly a mile long, of more altered monzonite, striking N 30° E and dipping slightly to the southeast. Numerous shallow surface cuts show copper carbonate stain and threads of chalcopyrite within a few feet of the surface. The mineralization is also indicated by large patches on the surface where the rock is stained brown with iron oxide. These patches lie between bounding reefs and bluffs of less altered monzonite.

Lower down the slope, a second zone traverses the middle of the group. This is approximately 800 ft. wide and is traceable at the surface with prospect pits for fully a mile. Here the formation strikes due north and south, with a flat dip to the east. This zone is also well mineralized, with both carbonate and sulphide ore showing wherever the surface has been cut. The two zones are entirely in the monzonite area, and, aside from magnetite, show limited evidence of the contact metamorphic mineralization so conspicuous in the greenstone a little further north. The rock is granitic, of medium grain, and shows small but conspicuous hornblende crystals and biotite with both orthoclase and plagioclase. The ore-bearing zones differ from the general formation, especially near the edges, in displaying a splashy bluish segregation of quartz and a chalky phase of the feldspar. Few of the crystals reach half an inch in length.

Evidence of Surface Oxidized Zone Lacking

I have repeatedly called attention to the possibilities of this prospect as a "porphyry copper" in my annual reports for the last fifteen years. The deposit has been examined by some well-known engineers during this period, including several of the leading "porphyry copper" people of the country. Engineers of the latter opposed the idea of its being a "porphyry," for the reason that evidence of a surface zone of oxidation is lacking. As the sulphides can be knocked off the surface croppings, they were thought to be confined to shrinkage and cleavage planes. M. R. Staight, of New York, was probably the first to give the deposit serious consideration. Mr. Staight enlisted the interest of some local stock men of means who are pushing development at present on the property with a small gas-driven compressor plant. The most important part of this work is a crosscut tunnel starting at the foot wall of the upper zone and striking directly across its course. The tunnel is now advanced 750 ft., the face being 550 ft. below the surface. In the first 350 ft. driven, the ore is largely confined to the joints and bedding planes. Careful moil sampling in ten-foot sections which I made along the succeeding 300 ft. of the tunnel to the face on June 15, 1919, gave an average result of a little over 1 per cent copper, with 50c. per ton in gold and silver. Combined samples from one forty-foot section gave nearly 3 per cent copper. This section may conform to some of the lens-like brown-stained patches on the surface. The last 100 ft. driven has not been sampled at the date of writing.

Chalcopyrite the Prevailing Mineral

The prevailing mineral is almost pure, soft chalcopyrite, which occurs in kidneys and in seams up to two inches thick along shrinkage and bedding planes and is also fairly well disseminated in the grain of the rock. It is associated with a smaller amount of marcasite, and, throughout the last 100 ft. driven, magnetite was conspicuously mixed with the chalcopyrite. Incidental seams of green carbonate and rusty gossan lines are met, and, recently, a narrow water course was penetrated that exhibited rich stringers of malachite and bornite. The rock of the formation is generally hard.

The bedding planes of the formation dip flatly to the east about 20 degrees, and are fairly uniform. They conform to the main bedding of the monzonite through an east-and-west cross section of the mountain. At the summit they become nearly horizontal and give the formation the appearance of a flat anticlinal dome, with a faulted or eroded western face. Some small foils and blunt crystals of molybdenum are occasionally found with the ore; also, as depth is gained, the coarser chalcopyrite shows black facings of secondary chalcocite.

Conjectures as to Origin of Deposit

It was suggested recently by a prominent engineer from Butte that the deposit was an aplitic differentiation in the form of a thick sill. The lower zone also has the same appearance. The occurrence of the mineral suggests primary magmatic diffusion and segregation, but there are also some interesting associated intrusives. One big fault cuts the zone in a northwesterly direction.

Between the two zones at the surface there is a belt, several hundred feet in width, of highly altered and disintegrated rusty brown granite, that is well seamed and fractured. This looks like a more favorable gangue for disseminated ore than the ore zones themselves, but shallow surface cuts show no conspicuous evidence of copper.

Between this belt of brown granite and the lower zone is a thick bed of felsite, or fine-grained aplite, probably 300 ft. wide and of undetermined length and shape. There are two conspicuous outcrops of siliceous black rock on the lower zone indicating a dike from two to ten feet thick, which carries copper carbonate where it has been opened with surface cuts.

Above the upper zone and intersecting it is a narrow dike of white aplite; also a dike of basic rock ten feet wide, which strikes northwest, with a flat northeast dip roughly parallel to the big fault. The latter dike appears at a distance like a steep trail on the bare mountain side near the summit. It is composed of a greenish-gray rock resembling altered diabase. The fault crosses the upper zone at an oblique angle, but does not interrupt the mineralization, which is exhibited in surface cuts on each side of its course.

It is the plan of the present operators to crosscut the

upper zone, then drift 500 ft. each way on the best center of mineralization, and crosscut again at the end of each drift, before deciding on milling equipment or undertaking the development of the lower zone. The latter, owing to a flat dip and a little easier slope of the mountain side, lends itself admirably to churn-drill sampling.

It is possible, judging from the greater dissemination of the sulphide mineral in the rock as the crosscut advances toward the hanging wall of the deposit, that the average value may be sufficient to warrant working the deposit on a large scale, over a width of several hundred feet.

The I. X. L. ore is similar to that of the Iron Dyke mine, at Homestead, Ore., occurring under related geologic conditions. The chief difference between the two ores is that the I. X. L. ore contains a larger proportion of magnetite and a smaller amount of pyrite.

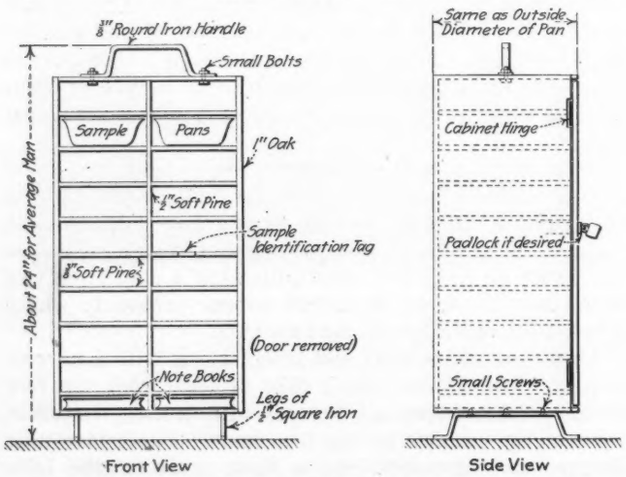
Among the natural advantages of the locality favoring future operation are several million feet of yellow pine and red fir timber growing on the middle slopes of the company's holdings. A good mill site is afforded at the lower end of the property, with a minimum flow of a little over three second-feet, or 150 miner's inches of water. Conditions readily permit of opening the property by means of a crosscut tunnel. A preliminary railroad survey has been made from Cambridge, on the Pacific & Idaho Northern Ry., to the mine, over a route sixteen miles long, with a maximum grade of 2½ per cent, which will make the property reasonably accessible.

Carrier for Mill Sample Pans

Wooden Cabinet Designed for Transportation of Samples From Mill to Testing Laboratory and To Obviate Loss by Overturning

BY ROY H. POSTON
St. Francois, Mo.

A WOODEN cabinet designed to be used for the transportation of pan samples from the mill to the testing laboratory is illustrated in the accompanying sketch. It is apparent from the cut that the chest



WOODEN CABINET FOR CARRYING MILL SAMPLES

is in no way elaborate and may be quickly constructed by the average mill carpenter at trifling cost.

As shown it is designed and dimensioned to be carried by hand, but if other means of transportation are available, it may adapted thereto, though in either case the legs should be retained, in order to keep it off the wet mill floor.

Each sample and pan are allotted a separate compartment, which may be permanently indicated on both the pan and its respective compartment, if the sampling is of the used routine nature. Separate compartments are also added for notebooks, pencils, and other articles.

If the cabinet is neatly joined together, and the several compartments are made absolutely tight, an accidental overturning will not mix the various samples if the door is closed, it being only necessary after such an accident to turn the cabinet on its back, open the door, and remove the spilled samples one at a time. Dimensions of the box must of course be made to conform with size and number of pans, distance to be carried, size of sample, and other operating and practical considerations.

California Mineral Production in 1918

The accompanying table shows the mineral production of California, in 1918, as compiled from the final returns to the California State Mining Bureau. The 1917 figures are given for comparison.

MINERAL PRODUCTION OF CALIFORNIA, 1917, 1918

Substance	Unit	1917	1918
Antimony ore	Tons	158	.....
Asbestos	Tons	136	229
Barytes	Tons	4,420	100
Bituminous rock	Tons	5,590	2,561
Borax	Tons	109,944	88,772
Cement	Bbl.	5,790,734	4,772,921
Chromite	Tons	52,379	73,955
Clay (pottery)	Tons	166,298	112,423
Coal	Tons	3,527	6,343
Copper	Lb.	48,534,611	47,793,046
Dolomite	Tons	27,911	24,560
Feldspar	Tons	11,792	4,132
Fuller's earth	Tons	220	37
Gold	Dollars	20,087,504	16,529,162
Gypsum	Tons	30,825	19,695
Infusorial and diatomaceous earths	Tons	24,301	35,963
Iron ore	Tons	2,874	3,108
Lead	Tons	10,826	6,732
Lime	Bbl.	500,730	436,843
Limestone	Tons	237,279	208,566
Lithia	Tons	880	4,111
Magnesite	Tons	209,648	83,974
Magnesium salts	Tons	1,064	1,008
Manganese ore	Tons	15,515	26,075
Marble (a)	Cu.ft.	24,755	17,428
Mineral paint	Tons	520	728
Mineral water	Gal.	1,942,020	1,808,791
Molybdenum ore	Tons	243	.....
Natural gas	M.cu.ft.	44,343,020	46,373,052
Petroleum	Bbl.	95,396,309	99,731,177
Platinum	Oz.	610	571
Potash	Tons	129,022	49,381
Pumice and volcanic ash	Tons	525	122,114
Pyrite	Tons	111,325	128,329
Quicksilver	Flasks	24,382	22,621
Salt	Tons	227,825	212,076
Sandstone	Cu.ft.	31,090	900
Silica (sand and quartz)	Tons	19,376	23,257
Silver	Dollars	1,462,955	1,427,861
Soapstone and talc	Tons	5,267	11,760
Soda	Tons	24,505	20,447
Strontium	Tons	3,050	2,900
Tungsten concentrates	Tons	2,466	1,982
Zinc	Lb.	11,854,804	5,565,561

(a) Includes onyx and serpentine in 1918.

In addition, there was produced cadmium, fluorspar, graphite, and molybdenum, which are not reported separately, probably to conceal individual business.

The total value of Cailfornia's mineral production in 1918 was $199,753,837, compared with $161,202,962 in 1917.

As compared with the 1917 output, the notable features of 1918 are the enormous increase in petroleum valuation and the decrease of over $3,000,000 in the gold yield. Of the metals, copper decreased approximately 740,000 lb. in quantity and $1,444,000 in value; gold decreased $3,558,342; manganese increased in tonnage and value; and quicksilver slightly in value. Silver, lead, zinc, and tungsten showed decreases.

Siberian Mines*

Present Mining Outlook in Old and New Districts—Primitive Methods of Prospecting and Exploitation—Effects of the War on Mining Development—Status of Gold Dredging—Mining Problems of the Future

THE years 1907 to 1915, inclusive, witnessed a remarkable activity in the development of a few of the gold and base-metal deposits of Siberia and the Urals, under the auspices of British capital and the technical control of American engineers.

KYSHTIM COPPER MINES

The Kyshtim Mining Corporation, Ltd., was built up from the ruins of a semi-defunct Russian company which had mined copper in a desultory way for a period of nearly a century before 1919. About £900,000 was raised in London by means of debentures, and pyritic smelting of the ore was introduced from abroad. This was found to be the salvation of the property, and under the able direction of Messrs. T. J. Jones, R. Gilman Brown, D. P. Mitchell, and H. H. Knox, the Kyshtim, from being an abandoned mine, became the largest copper producer in Russia. In 1916, the last full producing year, the output approached 15,000,000 lb. of metallic copper annually. This, although large for Russia, is only from one-quarter to one-tenth the output of the large "porphry" copper mines of the United States. A considerable output in gold was obtained yearly as a byproduct.

DEVELOPMENT ESTABLISHED LARGE RESERVES

The published reports indicate that when the mine was closed down owing to "nationalization," about three million tons of 3 per cent ore still remained as reserve, established by development. Much of the ground is still unprospected, and, besides important iron deposits which are worked on the property, an important discovery of nickel ore has been made.

The pre-war cost of producing copper at the Kyshtim property compared favorably with the average cost at American copper mines. Following the political crash in Russia, the expenses of operation became prohibitive, and at present, only destructive work is in progress in the Urals and in Russia. Also, there is no demand for the product, even did the political conditions allow the property to be operated. It will probably take from three to five years to restore this property to its former productiveness, even after the restoration of peaceful conditions in the Urals.

NUMEROUS PROMISING PROSPECTS

Other copper-mining properties in the Urals were the Sissert Co., Ltd., the Verk-Isetz Co., the Bogoslof Co., the Revdinsk Co., and the Tanalyk Corporation, Ltd. In the Kirghese steppe region, the Atbazar Mines, Ltd., and the Spassky Co., Ltd., also operated in a small way. The last three mines mentioned were controlled largely by British capital. Both the Sissert and the Revdinsk properties, near Ekaterinburg were in the development stage, but with good promise for the future, the ore being in many respects similar to that of Kyshtim. The Tanalyk property, in the Orenburg district, although started as a copper mine, was proving to be a more important producer of gold than of copper when operations were suspended in 1917.

A most important copper deposit of "porphyry," or disseminated ore, is stated to have been partly prospected by drilling by the engineers of the Irtysh Corporation, Ltd., This property is situated adjacent to the Ekibastus coal field, to the west of Pavlodar. In the published reports, the company has merely referred to the deposit in a general way, but it is said to be of large dimensions.

Altogether, the production of copper in Russia and the Caucasus in pre-war days was small, not filling the demand. It was infinitesimal as compared with what will be possible when the known deposits are exploited. Siberia, unquestionably the world's greatest storehouse of copper as well as of gold, produced practically no copper previous to the closing down of the industries due to the revolution. The Spassky Co., previously mentioned, produced a few million pounds annually, but with this exception probably no copper was produced in Siberia. Doubtless the first successful copper mining on any considerable scale will be in the porphyry deposits which can be mined by open cut with steam shovels, a minimum of hand labor being required.

LEAD, SILVER, AND ZINC

The two well-known base-metal districts of Siberia are the west Altai and the Nerchinsk-Argun regions. A much less known region recently developed for the production of zinc is the Te-Hu-He area, about two-hundred miles north of Vladivostok, only twenty miles inland from the seacoast.

Notwithstanding the fact that the Nerchinsk mining district was known over two hundred years ago, like the Altai region, to which reference has been made, it is still in the development stage. Both these districts are extensive, as large as whole states in the United States or Mexico, and contain deposits which are of great importance. They have both been held since discovery as the private property of the Russian Crown, only recently abolished.

An antique system of administration retarded the development of lead and zinc mining in both the Altai and Nerchinsk mining regions and stifled any attempt at industry. Silver has been produced from rich surface ores during the last century and a half, largely by forced labor.

WEST ALTAI REGION

In 1912, the Russo-Asiatic Corporation, Ltd. was formed in London, and D. P. Mitchell was sent to examine the so-called Cabinet Concessions in the West Altai. He selected as the best of the largest three mines, the Ridderski Kope, situated about fifty miles northeast of Ust-Kamenogorsk. A lease was obtained from the Cabinet of the late Emperor, and the Irtysh Corporation, Ltd., with a capital of £2,000,000. was founded to develop and operate this property. This

*Reprinted from a series of articles by C. W. Purington appearing in *Echo*, June 27, 28, and 29, 1919.

company also obtained the control of the Ekibastus coal mines, formerly part of the Popof properties, west of Pavlodar, and connected with the Irtysh River by fifty miles of standard-gage railway.

Ore-Treatment Problems Solved

In the five years preceding 1917, another railway was constructed by the company, connecting the Ridderski and Sokolni mines with the Irtysh River. Coke ovens and zinc retorts have been constructed, a concentrating plant has been erected at the mines, and a large amount of development and diamond drilling has been accomplished on the ore deposits. Some of the best mining and metallurgical talent has been employed, and the problem of effectually treating the complicated base ores is thought to have been solved. All preparations were made for a regular and profitable output of zinc, lead, silver, and gold, the four principal recoverable metals present in the ore.

Large Ore Reserves Estimated

It is estimated by competent engineers that the amount of ore in the Ridderski and its neighboring mine, the Sokolni, was sufficient, on a conservative basis, to net the shareholders £10,000,000 in the course of ten to twelve years after operations were well under way. This was estimating ore to only a moderate depth in two deposits; twelve other deposits of the famous hornstone were known to exist on the property, where surface indications were of similar character to the developed mines. Besides the deposit mentioned, the coal mines of the company were under competent management and a large amount was spent in preparations for an assured annual production, both for coking purposes in smelting the ores and for filling contracts with the Trans-Siberian railway.

It should be noted that the estimated future production of the Ridderski mine in gold, merely as by-product, was £1,000,000 annually or as much as the average production of the Lenskoie Gold Mining Co., which produced 25 per cent of the gold output of Siberia previous to 1915. It is one of Russia's unwritten tragedies, not yet realized, that this fine fabric of industry, the product of much thought, and well-directed energy, by high-class specialists, should be brought dangerously near to the verge of destruction just on the eve of its fruition, by the senseless acts of those who would have gained the most from it.

Other portions of the Altai zinc-lead domain have been developed by the Russian Mining Corporation, Ltd., of London, and this company in 1916 made copper discoveries on its property which may prove of importance. Altogether it is said that more than four thousand prospects exist in the Altai region showing silver-lead mineralization, only a small percentage of which have been worked or even inspected during the last three or four decades.

Lack of Systematic Mining

The Nerchinsk mining region, known to English readers since the time of Robinson Crusoe, who may be said, if one is to believe De Foe, to have been the first Trans-Siberian traveler, has not been the object of modern development. There are indications that it may yet become the seat of profitable base-metal mining, and it is perhaps fortunate for the future Siberian commonwealth that this great area has, as it were, been protected from half-hearted private exploitation in the past by the old Cabinet system. Under that régime, the convicts employed merely "gophered" out the rich streaks of silver ore near the surface, and did not attempt systematic mining of the important bodies of lead and zinc.

Possibilities of Coast Region

The coast region, as has been stated, contains the Te-Hu-He zinc mine, which has produced in the last few years a notable quantity of high-grade ore, and is not unlikely to be of importance in the future for the production of mixed base ores on a considerable scale. This region has the great advantage of being on the seacoast, and therefore is not dependent on a domestic market for the concentrates and zinc produced. Ample deposits of coking coal are also available in the vicinity; and should the region of these ores prove extensive, it is highly probable that the southern Sikota Aline may become the seat of an important lead- and zinc-smelting industry.

Mines of the Altai

Alexander von Humbolt is authority for the statement that gold has been mined in Siberia since the time of Herodotus, and the probability is that it was mined many centuries before that historian was born. All travellers in the southern Altai agree that ancient workings are numerous, although dates are not assigned. It is practically certain that much of the gold wrought into personal ornaments by the Greeks of the Chersonese found its way there from the Altai.

The recorded production of Siberia and the Urals since the middle of the eighteenth century is slightly less than £300,000,000 and with the thieving and illicit production which is the invariable accompaniment of gold mining, one may place the output during this historical period at not less than £400,000,000. The greatest single contributions to this output have been from the North Yenisei district and the Vitim district, which may be estimated at £50,000,000 and £80,000,000, respectively.

In 1754, a twelve-stamp mill was erected by a German engineer at Bereozovsk, near Ekaterinburg. The property on which this mill operated has continued to produce both quartz and placer gold with more or less regularity up to the present. Up to 1820, when location of claims by private parties was first allowed in Siberia, the Urals produced most of the gold recorded. Quartz mining was never an important factor, and placer mining became the greatest source of the metal.

Discovery of the Lena District

In the late 30's, the North Yenisei came into prominence; for several years before the discovery of gold in California this district was producing at the rate of from £1,000,000 to £1,500,000 per year. About 1842-50 the ore became exhausted, according to the standard of the work carried on, and the miners migrated east. One Trapeznikof located a claim on the Homolko river, a branch of the Zhuya, in the Olekma district, in 1847, and there was a rush to the region, now famous the world over as the Lena gold district.

In was not, however, until 1867 that Michael Sibiryakof located the famous Blagoveshensky mine, on the Nakatami, a branch of the Bodaibo Creek, tributary to the Vitim, and is said to have found by chance the deep-lying gravel which has since made this stream

and the Bodaibo known wherever placer mining is of interest. The claim mentioned proved the richest gold-gravel area of which there is record, 1,000,000 cu.yd. of bedrock gravel having produced £3,330,000.

The fame of Bodaibo Creek, which may be estimated to have produced over £40,000,000 in forty miles of length, is too well known to need description. A reality considered, it is but a fraction of the gold-bearing territory of the Vitim and Olekma districts, and, although worked out by the present Lenskoie company, there still remain important reserves of gold to be recovered by modern contrivances.

Antiquated Mining Methods

Up to 1914 the methods pursued in mining the drifting ground by the Lenskoie Gold Mining Co., were of that archaic description introduced into the Urals by some disciple of Agricola in the time of Katherine the Great. The so-called washing machines were of great historic interest, and one regretted that, on account of their bulk, it was impossible to transport them to some museum of antiquities.

Fortunately, in 1913 Reuben E. Smith, a mining engineer and specialist on placer mining, was engaged by the company. He at once essayed to improve the methods employed, and in the course of three years, in the face of most intense opposition by the Lenskoie board and many of the local officials of the company, succeeded in greatly reducing the cost and increasing the gold output. Stealing of coarse gold from the drift faces and dumps, which had for several years averaged £300,000 annually, was reduced to less than £100,000 in 1915. This was the result of the introduction of all-the-year washing of gold, instead of exclusive summer washing, as formerly. A most ingenious system was developed by Mr. Smith which allowed the gold to be washed every day of the year, even in the record winter temperature of 1914-15, when 88 degrees below zero, Fahrenheit, was recorded.

By this and other improvements, the introduction of standard Alaskan sluices, and the saving of fine gold which had formerly been lost, the output was gradually raised until in 1915 the record production of £1,800,000 in gold was reached. This, in fact, was a large output.

Underground improvements, such as the recovery of timber put into the workings, the reduction of man and horse power, and all round general cost-cutting had been introduced and the Lenskoie property, so far as working cost and production were concerned, was fast getting in line with the world's well-administered mines. But unfortunately the board at Petrograd had engaged the doctor when the patient had nearly expired, and the inevitable fact remained that Bodaibo Creek was worked out. Therefore, irrespective of any political disturbances, the Lenskoie output began to decline in 1916, and has steadily done so since. Although it is reported that the property is still being operated, the 1919 output will probably not reach more than 20 per cent of that of 1915.

Ancient Rights Handicap Exploitation

New discoveries of drifting gravel are reported from eastern areas of the property, remote from Bodaibo. Though it is possible that these will lend for a time a new drifting life to the property, a thorough liquidation of the present organization will be necessary, before even the richest gravel can be worked at a profit. Ancient poodage rights, imports, and other charges must be met by many of the best claims, serving to handicap their profitable exploitation, even were all the unnecessary overhead charges eliminated.

Aside from the Lenskoie Co., the output of any one mine in the Siberian or Ural territory is insignificant. The aggregate pre-war annual output of Russia was from £5,000,000 to £6,000,000 in gold. This was less than the daily cost of the war to Great Britain. Of this sum, the Lenskoie Co., annually contributed from 25 per cent to 30 per cent. Thus, notwithstanding the fact that Siberia promises to be the world's great gold-producing country of the future, it may be said to be at that turning point where the alluvial gold is largely worked out and the initiation of quartz mining, and the obtaining of gold as a byproduct from base-metal mines has not begun.

To select the areas where deep mining will be possible, and to develop the deposits, and determine the proper processes for extraction of the metal will require the services of foreign engineers from America, South Africa, and Australia. There is no intrinsic reason why the Siberian output will not eventually equal or even exceed the present annual output of the Transvaal, but the evolution of the industry will be slow.

Gold dredging, which has attained success in other countries, will also have a wide field, but up to the present it has hardly begun. Of about fifty dredges which have hitherto been installed in various districts in Siberia, only five are of any value as machines. Two of these are on the Pacific Coast, at the property of the Orsk Goldfields, Ltd., and three are in the Ural region, at the property of the Nikolai Pavdinsk Co. Gold dredges are only significant in increasing notably the gold production of a region when they are installed in multiple units on large areas, as the recoverable tenor of the gravel on which they operate is generally low, a few pence per cubic yard.

Platinum Dredging

I am credibly informed that twenty-seven so-called platinum dredges in the Ural region, mostly on the Iss and Tagil fields, were sunk during the political disturbances, but, with one or two exceptions, one may say that the loss of these mechanical contrivances is not greatly to be deplored. For the sake of the future of the platinum industry, it is to be hoped they will remain scrapped and be replaced by modern dredges.

The entire pre-war platinum output averaged about 150,000 oz. troy annually, and so far as can be gathered sunk to 80,000 oz. in 1917. The Iss field, by far the most important, if worked intensively by dredges for ten years, with an annual output of, say 300,000 oz., would probably be exhausted. It is not unlikely that other platinum fields will be discovered, either in the Urals or elsewhere, to take the place of this field when exhausted. It is also possible that certain zones of the Iss dunites may be found workable as a rock-source of platinum, since it is known that the platinum occurs in the dunite in recoverable quantity. The same may be said regarding the adjacent less important fields of the Pavdinsk estate and the Tagil.

I do not attempt to touch on the subject of coal and iron deposits, or of the great group of non-metallic mineral products, as these subjects merit treatment in separate articles. The best general résumé of Siberian and Russian mineral deposits in English was published some years ago in a small book entitled "The Times Book of Russia," obtainable from the London *Times*.

ORE DRESSING AND METALLURGY

Practical Suggestions and Progress
in Invention and Use of
Mechanical Appliances

A New Flexible Coupling *

Many designs of flexible couplings have been used for connecting shaftings in order to eliminate mechanical troubles due to misalignment, and although they have served their purpose to good advantage, there is always room for improvement.

The "Karge" cushion and flexible coupling, manufactured by the Three Rivers Machine Tool and Die Corporation, Phoenix, N. Y., is designed to take the place of flexible joints, gears, pulleys, beltings and any other mechanical devices used for the transmission of power. The cushion coupling is constructed of a special alloy steel and consists of a coil within a coil, wound in opposite directions. In other words, the coupling proper is formed in a cylindrical shape, so that it resembles a helical spring in appearance, and this member is shrunk in the sleeve at each end, being secured to the shaft or machine, as the case may be. A flexible spindle extends through the center of the coil, and a flexible sleeve is also placed on the outside of the coils for the same purpose as the spindle.

Where the flexible coupling is applied to a shafting or as a connection between two units, it can be bent and placed at almost any angle. It will absorb all shock and strain, and transmit the power in a satisfactory manner.

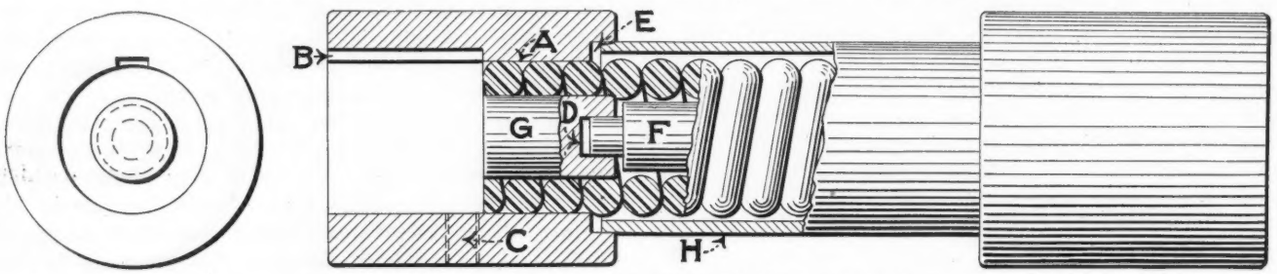


FIG. 1. DETAILS OF CONSTRUCTION OF FLEXIBLE COUPLING

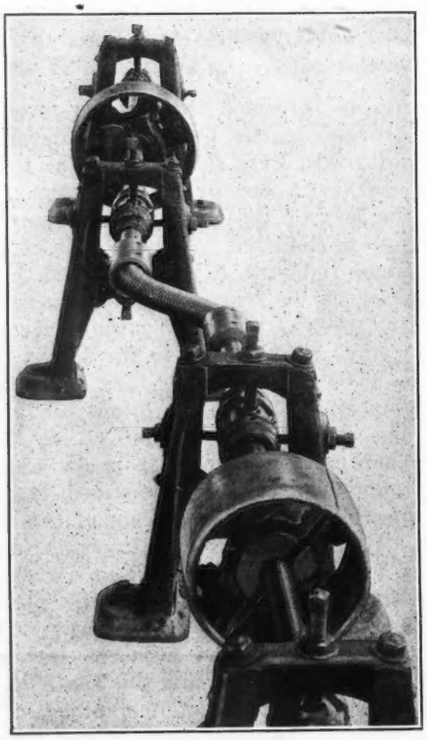


FIG. 2. COUPLING IN USE

Fig. 1 shows the details of construction. The end of the coupling is secured to the shaft by either a key or setscrews, as shown at *B* and *C*. The space between the plug and the floating spindle is to allow for contraction and expansion of the spring lengthwise, as shown at *D*. The space between the coupling and sleeve is to allow for contraction and expansion of the spring lengthwise, as shown at *E*. The floating spindle *F* limits the contraction of the spring, and has a sliding movement in the plug *G*. The sleeve *H* limits the expansion of the spring and has a sliding movement in the coupling.

Fig. 2 illustrates an application of the flexible coupling. All couplings are made of cast iron and the compression sleeves of steel. It is the practice to make the inside diameter of the coil spring the same as the outside diameter of the shafting with which it connects. When constructed in this manner, the couplings are claimed to have 30% more strength in torsion than the solid-steel shaft. The devices are made in various sizes for shafting from ½ to 6 in. in diameter.

*Abstracted and condensed from an article in *Power*, Apr. 22, 1919, p. 599.

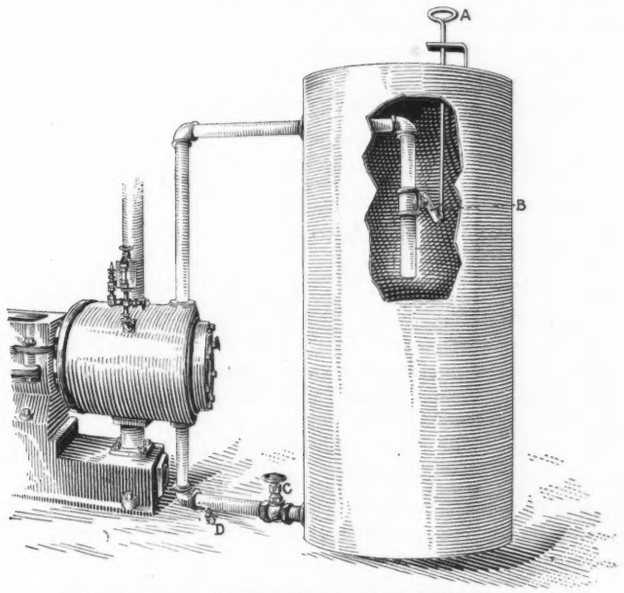
Circulating-Water System

BY C. E. DUTTON

Gas engines and compressors using water for cooling give considerable trouble in winter, owing to the water in exposed pipes and in the cooling tank freezing after a temporary shutdown. It is well known that still water in an open tank or vessel always freezes on the top first. A satisfactory method of overcoming these difficulties is shown in the accompanying sketch. The pipe connections to the tank are made in the usual way, excepting that the top connection is at least 1 ft. below the top of the tank, and no valve is placed on the overhead

line outside the tank. Instead, the line is run into the center of the tank and turned down, the valve *B* being at least 1 ft. below the elbow. A lever is then connected to this valve in the manner shown. The tank should always be kept full of water, and whenever the machine is shut down in cold weather valves *B* and *C* are closed at once and the engine is drained at *D*.

A temporary shutdown in the coldest weather will not interfere with the resumption of operations; in fact



METHOD OF PREVENTING THE FREEZING OF CIRCULATING-WATER PIPE

the tank would have to freeze almost solid before the system would be affected. The lever operating the valve will be frozen in, of course, but a little hot water, or drilling, will release it. Valve *C* and the nipple in the tank are generally protected by packing, but, if necessary, they could also be extended into the tank and operated like *B*.

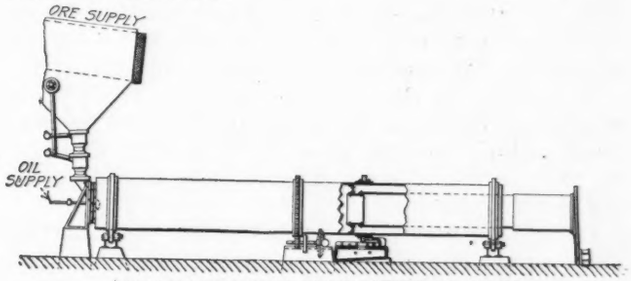
Such tanks are usually placed outside the engine room, and another good practice is to board them in, leaving about a foot of space between the tanks and walls, filling this space with manure or other handy non-conducting material to a foot or so of the tops of the tanks and then covering the shed with doors. This will not only keep out the cold winds but prevent undue vaporization in summer.

Handling Flue Dust

At the Nichols Copper Co.'s refinery on Long Island, N. Y., flue dust is mixed with cement in a concrete mixer. Just sufficient water is added to make a stiff mud. The mixed batch is poured into a charging buggy and wheeled into a yard contiguous to the blast furnace. Here it is dumped and allowed to harden for 24 hours. It is then broken up and shoveled into the charging buggies, wheeled to the elevators, and taken to the charging floor of the blast furnace, where it forms part of the charge. The method is one that requires little new equipment—practically nothing but the cement mixer. It is effective and is well worth the attention of smeltery managers who are starting up new plants. The amount of cement used is about 10 per cent of the weight of the flue dust.

Converter for Magnetizing Treatment

R. W. Irwin, has been granted a patent for an apparatus for treating ores preparatory to magnetic separation (No. 1,295,719 issued Feb. 25, 1919), comprising a converter having an inlet and an outlet and adapted to receive and permit passage of the ore and its associated gangue, means for feeding the ore and gangue, means for maintaining a magnetizing reagent in the converter which is adapted to render the ore magnetic, and means for sealing the inlet and the outlet against the entrance of air and adapted to permit free passage of the ore and gangue to and from the converter.



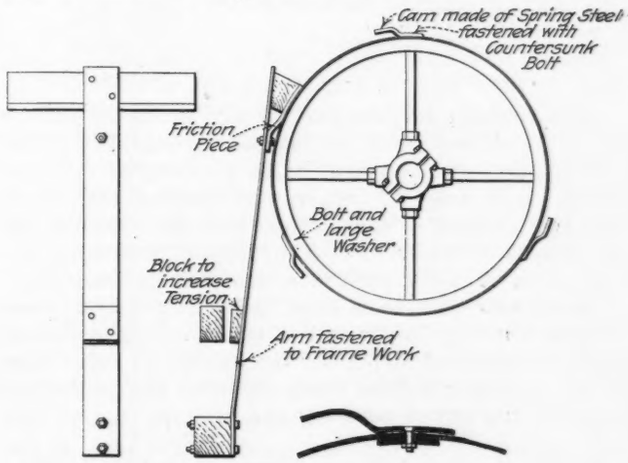
APPARATUS FOR MAGNETIZING ORES

The apparatus is shown in the accompanying cut. A pipe conveying oil at high pressure projects into the cylinder, as shown, and a gaseous hydrocarbon atmosphere is maintained. Certain ores, such as limonite and red hematite, are non-magnetic, but are rendered magnetic by a treatment in the converter described.

Trommel Screen Cleaner

BY CHARLES LABBE

In screening a roll product, the apertures of the trommel often become clogged, but may be freed by means of a spring arm attachment. This is made of a good piece of 1-in. x 4-in. lumber, about 6 ft. long, with a crosspiece of fairly hard wood 18 to 24 in. long. The a m is fastened at one end with bolts on one side of


Cam made of Spring Steel fastened with Countersunk Bolt
Friction Piece
Bolt and large Washer
Block to increase Tension
Arm fastened to Frame Work

SPRING-ARM TROMMEL CLEANER

the framework. The cams are made of discarded wagon spring, and measure not less than 2 in. wide by ⅜ in. thick. The friction piece on the arm is made of the same material, and the cams are fastened on the screen itself by countersunk bolts and large washers.

COMPANY REPORTS

Annual and Quarterly Reviews
of the Activities of
Operating Mines

Utah Copper Co.

According to the forty-fifth quarterly report of the Utah Copper Co., covering the second quarter of 1919, the gross production of copper contained in concentrate for this quarter is as follows: April, 9,309,256 lb.; May, 9,058,715 lb.; June, 9,155,629 lb.; total, 27,523,600 lb. Average monthly production, 9,174,533 lb.

In addition to the above, a total of 523,378 lb. of copper was contained in precipitate from the leaching plant, making the total gross production for the quarter 28,046,978 lb., as compared with 29,261,209 lb. for the previous quarter.

During the period there was treated at the Arthur plant a total of 1,242,500 tons, being 284,000 tons less than for the preceding quarter. The average grade of the ore was 1.35 per cent copper, as compared with 1.27 per cent copper for the first quarter, and the average recovery was 81.80 per cent, as compared with 74.70 per cent for the preceding quarter, being a decided improvement.

The average cost per pound of net copper produced, including plant depreciation and all fixed and general charges, but excluding Federal taxes, and without credit for gold and silver or miscellaneous income, was 11.59c., as compared with 13.72c. for the first quarter, calculated in the same way. The value of the gold and silver in concentrates and the miscellaneous income for the quarter amounted to 5.40c. per net pound of copper produced.

The financial results of the operations for the quarter are as shown below:

Net profit from operations	$1,043,757.53
Other income, rents, etc., in Utah	1,233,158.80
Income from Nevada Cons. Copper Co. dividends	375,187.50
Total net profit	$2,652,103.83
Disbursement to stockholders	2,436,735.00
Net profit	$215,368.83

The earnings for the quarter are computed on the basis of 14.74c. per lb. of copper, as against 12.89c. for the previous quarter. The low carrying price is due to the small sales of copper made during the period and the increase in the amount of copper unsold and carried at 13½c. per lb. The regular quarterly disbursement of $1.50 per share was paid on June 30.

Operations were continued on the curtailed basis of approximately 50 per cent of normal. The operating cost per pound of copper for the quarter is lower than it has been for a long time, fulfilling the prediction made in the report covering the first quarter of this year.

During the period there was removed a total of 333,048 cu.yd. of capping, being an average of 111,016 cu.yd. per month, as compared with 379,264 cu.yd. and 126,421 cu.yd., respectively, for the first quarter of the year. This decrease was due to the second curtailment of operations, which took effect about Mar. 1.

A daily average of 6,753 tons of ore and of 1,981 tons of commercial freight was transported over the Bingham & Garfield Ry. making a total daily average of 8,734 tons, as compared with 13,520 tons per day for the previous quarter. This decrease was caused by the curtailment in the operations of the Utah Copper Co.

Nevada Consolidated Copper Co.

The fortieth quarterly report of the Nevada Consolidated Copper Co., for the quarter ended June 30, 1919, states that the production of copper for the three months was 11,149,362 lb., as compared with 12,201,444 lb. for the quarterly period ending Mar. 31, 1919. During the quarter, 558,525 dry tons of ore of an average grade of 1.42 per cent copper from the shovel pits and the Ruth mine was treated, as compared with 529,692 dry tons, averaging 1.79 per cent copper, for the previous quarter. Of the tonnage milled during the quarter 68 per cent was supplied from the pit, and 32 per cent from the underground workings of the Ruth mine. No custom ore was offered for treatment during the quarter.

The cost of production per pound of copper for the quarter, including charge for depreciation of plant and equipment, and the usual overhead or fixed and general expenses, but without credit for gold and silver recovered and miscellaneous earnings, was 18.07c. per lb. The value of gold and silver recovered and the miscellaneous earnings for the second quarter amounted to 4.61c. per lb. of copper. The costs for the preceding quarter, calculated upon the same basis, that is, including charge for plant depreciation and the fixed and general expenses, but excluding credit for miscellaneous earnings, were 16.85c. per lb. of copper.

The total production for the first six months of the current fiscal year averaged 3,891,801 lb. of copper per month, as compared with an average of 6,500,000 lb. per month for the first six months of the preceding year, indicating that the program of production curtailment made necessary by prevailing industrial conditions has been consistently observed.

The financial results of operations for the quarter, as below, include charges to cover depreciation of plant and equipment as operating costs:

FINANCIAL STATEMENT NEVADA CONSOLIDATED COPPER CO., SECOND QUARTER, 1919

Operating loss	$329,970.55
Earnings from investments and miscellaneous	514,748.23
Net gain	$184,777.68
Distribution to stockholders	749,796.38
Net deficit	$565,018.70

The operating income upon which the earnings for the quarter are based is computed at 15.12c. per lb. of copper, as compared with 13.6c. per lb. for the preceding quarter. This slight increase in the carrying price is due to the fact that the sales of copper during the quarter were increased to some extent, all unsold copper being carried, as usual, at 13.5c. per lb. The actual sales of metal for the quarter, however, did not equal

the production for the period, which resulted in a further increase of unsold copper on hand and in transit.

A general improvement in industrial conditions at this time would seem to indicate a slow but gradual increase in domestic consumption and a decided stimulation of foreign demands. Though this fairly well-defined improvement in the copper market gives promises of further expansion, the management has considered it advisable to continue the output of copper on the present basis of curtailment until some part of the company's accumulation of copper stocks can be marketed to advantage.

Canada Copper Corporation, Ltd.

The annual report of the Canada Copper Corporation, Ltd., for the year ended Dec. 31, 1918, was issued July 17, 1919. Operations at the Mother Lode mine and at the smeltery at Greenwood, B. C., terminated on Nov. 26, 1918, upon which date the plant closed down owing to the low grade of the remaining ores in the company's older mines. So far as can be foreseen, the company's operations in the Boundary District have been brought to a conclusion.

During the year, 154,332 tons of Mother Lode ore were mined and smelted. This compares with 203,478 tons for 1917. From this, and custom ores purchased and smelted, the production of metals was as follows:

Copper (fine), lb.	2,813,993
Silver (fine), oz.	60,495
Gold (fine), oz.	12,662.8

During the last few months, the grade ran off rapidly, until the shipments were running below 0.7 per cent copper. Under such circumstances, it was evidently impossible to operate at a profit, so measures were taken to close down. These included a careful survey of the mine and the stoping of any ore of pay grade. After this had been extracted, operations ceased. The average analysis of the ore produced during the year was as follows:

Copper, per cent	0.856
Silver, oz. per ton	0.185
Gold, oz. per ton	0.039

The Lone Star Mine was operated until July 23, during which period 3,540 dry tons of ore was shipped. Greater care was used in sorting the ore, so that the grade was slightly higher than in 1917, containing copper 2.04 per cent, silver 0.14 oz. per ton, gold 0.022 oz. per ton. The expense was, however, much higher. This property is in much the same condition as the Mother Lode. It contains a considerable quantity of low-grade material, but it is practically impossible to produce ore of payable grade at a cost low enough to leave a profit.

At the Copper Mountain property, the permanent development and construction program begun in 1917 was continued up to Sept. 1, when, most of it being completed, the work ceased, to be resumed in the spring. The ore reserves remain as last year—10,000,000 tons assured and 2,000,000 tons probable, of an average grade of 1.74 per cent.

The development performed consisted of 1,710 ft. of tunneling, 146 ft. of drifting, and 3,694 ft. of raising, or a total of 5,560 ft. Also, 289 ft. of level workings were widened. No prospecting was done to develop additional ore reserves.

Up to April, 1919, construction of the mill at Allenby proceeded at a satisfactory rate, but labor trouble which then developed in the forces of the railroad construction has since caused delay.

Chino Copper Co.

The thirty-first quarterly report of the Chino Copper Co., covering the second quarter of 1919, was issued on Aug. 5, 1919. The gross production of copper contained in the concentrate from milling operations for the period under review was 10,541,471 lb., compared with 11,512,133 lb. for the previous quarter. The total amount of ore treated for the three months was 401,100 tons, equivalent to an average of 4,408 tons per day. This daily average is 1,083 tons less than that milled for the first quarter of 1919. The average assay in copper of the ore treated for the second quarter was 1.83 per cent as compared with 1.80 per cent for the first quarter of 1919. The ore milled during the second quarter was considerably more favorable to concentration than that treated during the previous quarter.

The recovery per ton of ore milled for the quarter under consideration was 26.28 lb. of copper, as compared with 23.29 lb. for the first quarter of 1919. There was produced 26,830 dry tons of concentrate, averaging 19.64 per cent copper, as against 41,589 dry tons, averaging 13.84 per cent copper, for the first quarter.

The cost per pound of net copper produced from milling operations for the second quarter, after allowing for smeltery deductions and including depreciation, was 14.16c., as against 15.03c. for the first quarter of 1919, calculated the same way. The cost figures shown do not include any charge for federal income or excess-profits taxes, nor do these costs take into consideration miscellaneous income. There were no gold and silver credits from the concentrates produced during the second quarter.

The financial results of the company's operations for the second quarter are shown in the following table:

Net income from copper production (only)	$44,031.05
Miscellaneous income	326,384.19
Total	$370,415.24
Disbursement to stockholders	652,485.00
Deficit after disbursements to stockholders	$282,069.76

The above figures are based on a carrying price for copper of 14.60c. per lb. for the second quarter of 1919, calculated in the usual manner of inventorying the unsold copper at 13½c. per lb. A disbursement of 75c. per share was made to stockholders during the second quarter of 1919.

During the period under review there was removed by steam shovels at Santa Rita a total of 1,084,668 cu. yd. of material, equivalent to an average of 361,556 cu. yd. per month, as compared with a total of 1,060,765 cu. yd. of material during the first quarter of 1919, and an average of 353,588 cu. yd. per month. Of the total material removed during the second quarter, 818,195 cu.yd. was stripping, the remainder being equivalent to 546,423 tons of ore, of an average grade of 1.62 per cent copper, according to mine sampling and assaying. The difference between the tonnage mined and the tonnage milled during the second quarter is in part oxidized ore, which was sent to the mine stockpiles.

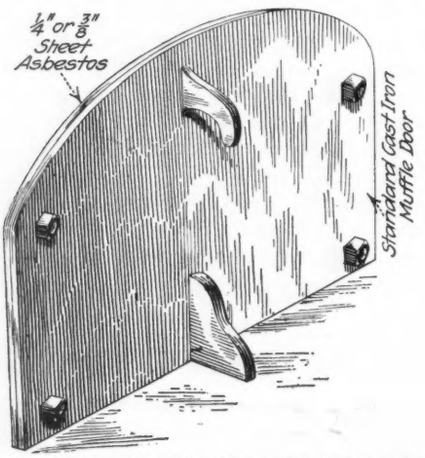
Camp Bird, Ltd.—During the quarter ended Mar. 31, 1919, the tunnel level east was extended from the end of the tunnel company's ventilating drift a distance of 206 ft.; crosscuts and drifts therefor, 465 ft.; raises, 47 ft.; total development, 718 ft. The company's ventilating raise was advanced 19 ft. The drive east is in vein of no commercial value. The supply of labor is fair. Wages in the district have been again advanced 50c. per day, making the minimum wage scale $4.50.

ASSAYER AND CHEMIST

Laboratory Methods and Hints
for the Mine Assayer and
Works Chemist

Improved Muffle Door

The cast-iron muffle door used in connection with assay furnaces and sold by any chemical supply house is to be preferred to the tile door, because of its greater durability and especially because it can be handled more easily. It has, however, one fault, that of radiating the muffle heat too rapidly. This objection may be overcome satisfactorily in the simple manner shown in the accompanying illustration. A piece of ¼-in. or ⅜-in. sheet asbestos is cut to conform to the size and shape



IMPROVEMENT ON STANDARD CAST-IRON DOOR FOR ASSAY MUFFLE

of the door. Four or more holes are drilled through the iron door and asbestos sheet, the latter is placed on the rear side of the door, and ¼-in. bolts, provided with large washers, are slipped through from the rear, and drawn up tight by means of the nuts. This asbestos sheet is a good heat insulator, lasts for considerable time, and is easily changed.

A Bone-Ash Economy

BY C. R. COREY

Having observed the waste of bone ash in used cupels that were not entirely saturated with litharge, it occurred to me to investigate the matter, and the following experiments were conducted:

One hundred pounds of used cupels, a fair sample of a quantity that had accumulated during the last few years at the laboratories of the University of Washington, was revolved, without previous crushing, in a cylindrical mill, containing neither balls nor pebbles, for 15 minutes. The product was then screened on a 20-mesh sieve, the oversize, containing the hard saturated part of the cupels, was put aside, and the undersize, the unstained or unsaturated part, together with some small pieces of saturated bone ash, was screen sized.

The weight of the material passing the 20-mesh sieve was 35.88 lb. The part that passed the 80-mesh sieve, 18.34 lb., was mixed and made into new cupels in the usual way. These were dried for one month, together with others made from the regular stock of bone ash. Tests for hardness, absorption of litharge, and silver were then made.

Rate-of-absorption tests for litharge were made by cupeling 20 gm. of pure lead in each cupel, the two different lots of cupels being placed side by side in a gas-fired muffle furnace, four cupellations being made at one time and four different lots being run. Practically no difference was observed in the rate of absorption of the litharge.

The next and last test was to note the silver lost. Eight cupellations were made. The weights of the silver before and after cupeling were as follows:

ABSORPTION OF SILVER IN RE-MADE AND NEW CUPELS

Number of Cupel	Silver Taken, mg.	Silver After Cupellation, mg.	Silver Lost, mg.
1	19.85	19.80	0.05
2	19.90	19.76	0.14
3	19.95	19.87	0.08
4	19.80	19.62	0.18
5	20.00	19.77	0.23
6	19.87	19.70	0.17
7	19.84	19.60	0.24
8	19.92	19.65	0.27

Odd numbers are the re-made cupels; even numbers, those made from stock bone ash. The temperature at the start of cupellation was 850° C. At the end of two minutes all were "driving"; at the end of five minutes the temperature was 830° C. It was further lowered to 790° C. and when near the finish was raised to 880° C.

The tests show that nearly 36% of the bone ash was knocked loose in the ball mill, and half of this would pass an 80-mesh screen without further grinding; so 18% was available for re-use. The color of the recovered bone ash was only a little darker than that of the original, and the material proved to be as effective as the original and unused bone ash.

Copper Ore Treatment

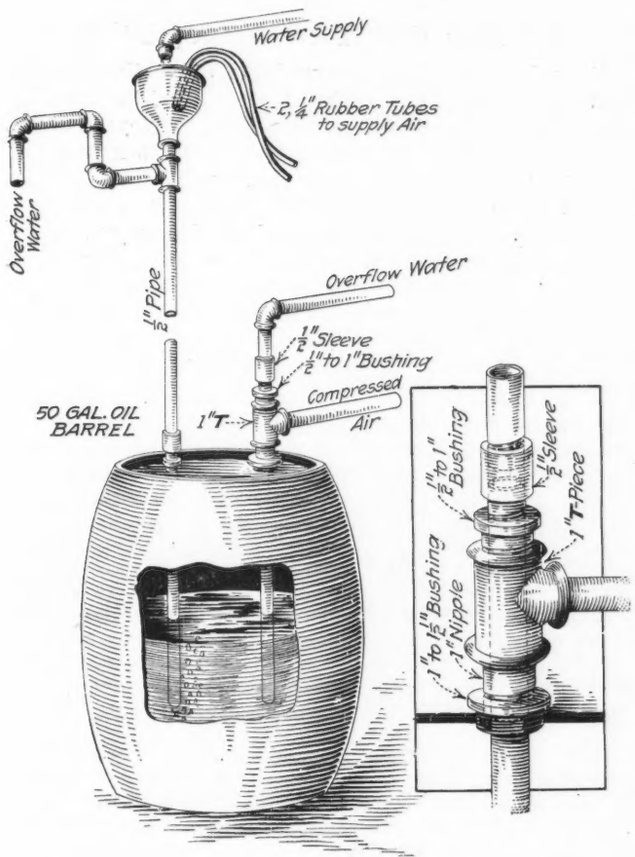
U. S. Patent 1,296,523, has been issued to Joseph Irving, under date of Mar. 4, 1919, for an invention which relates to a process for the treatment of cupriferous ores, compounds, or products, for the extraction of metal therefrom in soluble form, and for the recovery of the metal. Its objects are to effect in such a process a continuous regeneration of the reagents the presence of which is desired, and simultaneously to eliminate undesirable reagents, to avoid waste, to reduce the amount of added chemicals required to a minimum, and to render the process cyclic in all its parts in so far as is possible.

The process includes subjecting the ore to the action of an iron-containing electrolyte from the copper-depositing tanks, removing the electrolyte and the copper therefrom, washing the treated ore with an iron-containing solution, passing the solution over iron, thereby reducing the iron salts contained therein and precipitating copper therefrom, and again washing the treated ores with the solution.

Compressing Air for the Laboratory

BY A. E. SCHIFFESON

A cheap and simple air compressor used to furnish low-pressure air and requiring only a low head of water was recently utilized in making a series of cyanide tests where power was not available.



METHOD OF OBTAINING COMPRESSED AIR FOR EXPERIMENTS

As shown by the accompanying sketch, a 50-gal. oil drum was used, having ¾-in. and ½-in. threaded openings in one head. The ¾-in. opening was bushed down to ½ in., the ½-in. bushing tapped so that a ½-in. pipe could be screwed in from below, and the thread on the pipe was cut long enough to extend through the bushing to receive a ½-in. sleeve. Into this the water standpipe was screwed. The 1½-in. opening was bushed to 1 in. and a 1-in. nipple and tee screwed on. The top of the tee was bushed to ½ in. and received a ½-in. pipe from below, passing through the bushing and into a sleeve which was connected to the water overflow pipe.

Two ¼-in. rubber tubes are inserted into the feed end of the standpipe and allowed to extend several inches below the 1-in. to ½-in. reducer. The device requires little water to operate, and this amount can be further reduced by increasing the length of the standpipe, as can readily be seen. The arrangement supplied air for four small agitators of one liter capacity each. The supply of air is constant and the pressure can at all times be kept uniform.

Determining Silica in Uranium Ores

BY C. W. DAVIS

While attempting to estimate the silica content of a precipitate obtained by the addition of barium chloride and sulphuric acid to a slightly acid extract of a uranium ore, it was found that, if sulphuric acid was added to the ignited precipitate and the paste again ignited, an increase in weight resulted. Since the determination of silica by the hydrofluoric-acid method involves ignition with sulphuric and hydrofluoric acids, this observed increase in weight, which occurred even in the presence of hydrofluoric acid if the silica content was low, completely vitiated the results obtained.

A qualitative examination of the precipitated sulphates showed the presence of iron and uranium, as well as the sulphates of barium and radium. To determine what elements were responsible for the erroneous results secured, several solutions were prepared from which the barium sulphate was precipitated by means of sulphuric acid.

WEIGHTS OF PRECIPITATE ON IGNITION

Content of the Solutions	Change in Weight of Ignited Ppt. (per Gram of Ore) When Ignited with Sulphuric Acid
Nitric acid ext. of uranium ore and barium chloride.	Gain = 0.014 gm.
Uranium nitrate, iron nitrate, and barium chloride.....	Gain = 0.018 gm.
Iron nitrate and barium chloride.....	Loss = 0.0005 gm.
Barium chloride and nitric acid.....	Loss = 0.0003 gm.

The accompanying table indicates that iron and uranium, in a slightly acid solution of barium chloride, will be precipitated along with barium sulphate when sulphuric acid is added. This precipitate, after being ignited, will increase in weight when re-ignited with sulphuric acid. The increase must be due to the iron and uranium content, as barium sulphate alone is not affected by the sulphuric-acid ignition. The iron and uranium, if in the form of an iron uranate, would be converted to the sulphates, thus causing the weight to increase when ignited with sulphuric acid.

This difficulty in the determination of silica by the hydrofluoric-acid method can be easily overcome by first igniting the sulphate precipitate with sulphuric acid and then with sulphuric and hydrofluoric acids, the difference in weight of the ignited residues giving the weight of silica in the sample.

Gravimetric Determination of Copper*

A cupric salt is mixed with an excess of sodium nitroprusside solution acidified with dilute sulphuric acid, the mixture diluted to 170 c.c., shaken for two to four hours, the precipitated cupric nitroprusside then collected on a tared filter, washed with water, dried at 110° C., and weighed; it contains 22.75% Cu. The yield averages 99.2% of the amount of copper present in the original sample.

To determine copper in the presence of mercury, the copper is precipitated as cupric nitroprusside as described, but in this case a known excess of *N*/10 sodium chloride solution is also added to prevent precipitation of mercuric nitroprusside. The mercury in the filtrate from the copper precipitate is then precipitated as sulphide or determined by titrating the excess of sodium chloride with standard mercury solution. The presence of lead and bismuth does not interfere with the determination of copper, but tin salts should not be present.

*Abstracted from an article by E. Votocek and J. Pazourek in *Chem.-Zeit.*, and reprinted in *Jour.* Soc. Chem. Ind., Dec. 16, 1918.

NEWS FROM WASHINGTON

By PAUL WOOTON
Special Correspondent

The Oil Land Leasing Bill

Indications point at this writing to an early vote on the Oil Land Leasing bill. Senator La Follette, after many hours' debate in opposition to the bill, began the presentation of his amendments on Aug. 30. Some of those presented have been accepted, but the more important ones do not meet with approval. For instance, one of Mr. La Follette's amendments provides: "That the Government hereby reserves the right at all times, under rules and regulations to be prescribed by the President, to determine, fix, and control the selling price of all products derived from lands leased hereunder, whether in the crude or natural condition or in other merchantable form, which shall be a reasonable price both as to the producer and the consumer; and the reservation of such right shall be expressly stated in each lease."

The mooted question as to what extent the bill invalidates present locations upon which no discoveries have been made was brought to a head when Senator Jones, of New Mexico, presented to the Senate telegraphic protests from his state alleging that thousands of claims would be voided for lack of discovery. Senator Smoot claims that Section 36 of the bill protects such cases as these cited by Senator Jones. Section 36 reads:

> That the deposits of coal, phosphate, sodium, oil, oil shale, and gas, herein referred to, in lands valuable for such minerals shall be subject to disposition only in the form and manner provided in this act, except as to valid claims existent at date of the passage of this act and thereafter maintained in compliance with the laws under which initiated, which claims may be perfected under such laws.

Commenting on the question, Senator Smoot said:

> The bills that have been heretofore introduced used the language "except as to valid locations" and that has been changed to "valid claims." That was done as the result of the decision of the United States Circuit Court, in which the court upheld the Western American Oil Co. in the claims that they had which were contested by the Government of the United States. I am quite sure that under Section 36 of the pending bill if the parties referred to by the Senator have complied with the law and have made their locations under existing law and continued to comply with the law so that up to date they have valid claims, under Section 36 of this bill they will not be interfered with in any way.

Freight Rates From Pacific Ports

A supplemental tariff covering ocean rates from Pacific Coast ports to European ports has been issued by the Shipping Board. In this tariff the rate on arsenic to United Kingdom ports is $1.90 per 100 lb.; on brass and copper scrap in packages, $2 per 100 lb. Quicksilver in flasks and sulphur take the same rate. Tin scrap in bales takes a rate of $1.75. An addition of 25c. per 100 lb. is charged when the destinations are French Atlantic ports, Antwerp or Rotterdam. The addition for Christiania, Copenhagen and Gothenburg is 50c., while the addition to Stockholm is 75c.

New Law Will Affect Appropriations

It is believed that appropriations for Government bureaus are certain to suffer as a result of the recently enacted statute preventing officers and employees of the Government from communicating with members of Congress in regard to such appropriations. In the past it has been customary for specialists in many of the Bureaus to explain the need of the appropriation for their work to individual members of the House and Senate. Members of Congress have so many demands on their time that they can study into all phases of such a situation only infrequently, unless they are particularly interested. It has been found that a few minutes' personal talk on the part of someone who can present briefly and concretely the need for the money is one of the best methods of getting essential information to a lawmaker. That the law will have a particular effect on the technical bureaus is certain since the nature of their work is less understood.

The law also forbids Government officials and employees from engaging in propaganda among the public in behalf of appropriations. To that provision there is no objection on the part of the officials.

Tariff Bills in the Senate

There is no tendency on the part of the Senate to rush through any of the tariff bills which have been passed by the House and are now pending before the Committee of Finance. Senator Penrose, of Pennsylvania, the chairman of the committee, is of the opinion that world conditions are too disturbed at this time to permit of intelligent legislation on the tariff, and apparently he is not greatly impressed with the assertions that higher duties must hurriedly be made effective. Nevertheless, he expects to take the matter up in the near future with the committee, and if it is decided to go ahead with the legislation at this time an opportunity will be given to those interested to be heard.

Rulings on Child Labor

A series of rulings have been issued by the Commissioner of Internal Revenue relating to the child labor provisions of the 1918 revenue act. A tax of 10 per cent is levied on the entire net profits of any mine or quarry in which children under sixteen years of age are permitted to work. A similar tax is imposed on mills, canneries, workshops and factories. The law does not apply to children who may be employed in offices or such operations which are physically separate from the mine or manufacturing establishment.

A contract for 500,000 bbl. of oil fuel has been placed with the Mexican Petroleum Corporation by the U. S. Shipping Board. The price was $1.18 per bbl., and it is to be delivered at the American bunkering station at St. Thomas, W. I.

Manning Discusses Petroleum Industry

Co-Ordination of American Petroleum for Purposes of Research—American Participation in Development of Foreign Oil Fields Essential

AT A CONFERENCE held on Aug. 15 at the Engineers' Club of San Francisco, Cal., Van. H. Manning, Director of the Bureau of Mines, addressed the local oil men on the necessity of perfecting the organization of the American Petroleum Institute and of securing an annual fund of $1,000,000 for the purpose of encouraging research in petroleum technology. Mr. Manning presented the following review of the petroleum situation:

I expect to see improvements in the technique of the recovery of oil and the protection of oil and gas against waste take place in the general development of this country. I am looking forward to the future; to the growth of better methods for producing and utilizing oil and gas. I am confidently expecting tremendous progress along these lines, and look forward to the day when the methods which are now used in our oil fields will be looked upon as most crude and inefficient. I expect to see more oil taken from the ground than is now thought possible. I expect to see it recovered with less loss. I expect to see it utilized with far greater efficiency, and that the producers and refiners of oil and those who consume oil and its products will derive far greater benefits from it than at present. In this progress, in this development, it is my hope that the Bureau of Mines will take a most commendable part.

There is the advantage of doing a public service and of having the public confidence, so I do not feel that our contributions will be negligible. I hope the Bureau of Mines will be an active agent in inducing progress. To use a chemical term, it should be the catalyzer of the industry.

I take advantage of this opportunity to speak of the American Petroleum Institute. On this subject, I shall speak both in my private capacity as Director of the American Petroleum Institute and in my public capacity as Director of the Bureau of Mines. The American Petroleum Institute is essentially a getting together of all the oil and gas men into a one-unit organization for the purpose of inducing progress. What I have said about the progress I expect to see in the next twenty years in the petroleum industry I confidently hope will come about largely through the American Petroleum Institute. It will be the greatest mistake in the history of the oil industry if the industry does not take this opportunity to promote the Institute and foster its growth in every possible way. It is a big conception, but it is by no means a new thing, as similar institutes have been founded in other industries and have been of inestimable benefit. The interests of the petroleum industry and of the country will be harmed unless the industry supports this movement, and I feel that the progress in oil and gas will be greatly retarded if advantage of this opportunity is not taken.

The following may be enumerated as some of the objects of the institute:

1. To present a united front in all matters relating to the industry when it is of national import.
2. To serve as spokesman for the industry itself, to Congress and to Government and state agencies.
3. To avoid political embarrassments on the part of legislation.
4. To draft uniform law and urge its adoption in all the states.
5. To safeguard the industry both at home and abroad, from the standpoint of foreign competition.
6. To study foreign and domestic commerce.
7. To conduct a statistical bureau.
8. To study various problems such as cost accounting, labor conditions, tank car traffic, and similar matters.
9. To publish a bulletin through which the various needs of the industry can be co-ordinated.
10. To conduct a welfare committee.
11. To establish a research bureau.

Through this agency, various producing, refining, and internal-combustion interests could be co-ordinated by the establishment of a research fund, which would encourage Government and private initiative, and would attract inventors and owners of patents and patent rights, whose patents could be tried out on a commercial scale, and, if successful, adopted by the entire industry on a payment of a small royalty, which would provide a revolving fund after the first investment is made, which fund would be used in the payment of a bonus or a royalty to the patentee.

I have estimated that to carry on this work in a successful manner a million dollars per annum should be provided by the petroleum industry, which amount should be distributed between the producers of oil, refiners, and producers of natural gas. The total gross production in 1918 was about $2,500,000,000. To raise this one million dollars would take one-twenty-fifth of 1 per cent, or $1 out of each $2,500 gross profit.

I want to say a word concerning the international policies affecting the petroleum industry. On July 29, 1919, there was published in the *Congressional Record* a report which I submitted to the Secretary of the Interior on this subject. There is no other situation in respect to future supplies of essential raw materials for the United States, and in respect to our future trade, which is at the present time so important and so critical as the petroleum situation. In so far as America is concerned, the whole complexion of our petroleum industry has changed within the last two years. We are now consuming more crude oil than we produce, depending upon imports to make up the deficit. The geologists of the Department of the Interior say that there has been taken out of the ground and used up 40 per cent of our natural petroleum reserves, whereas we have used up but 1 per cent of our coal. On account of our past over-production, and apparent abundance of petroleum at home, Americans have not gone extensively abroad for petroleum supplies and reserves. American oil-producing companies are to be found only in Mexico, Central and South America, and Roumania. The vast potential resources of Africa and of the Near and Far East have been neglected by our nationals up to this time, partly on account of our plentiful but fast diminishing supplies at home, and partly because they have felt that large investments of this nature far abroad would not be secure.

This country holds the premier position in the petroleum industry of the world, and now produces yearly between 65 and 70 per cent of the world's total production. This position has been and is our national right because of our immense production, and more because of our even greater consumption.

The latest statistics disclose the fact that in 1918 our domestic consumption was practically equal to our domestic production, and more than 5.3 times greater than our exports, which were abnormal, on account of ten months of war, during which time more than 80 per cent of all the petroleum products consumed by Great Britain, France, Italy, and the A. E. F., as well as neutral Europe, had to come from this country, for reasons of limited ocean transport.

Production and not refining and marketing organizations is going to be the key to independence in respect to the world's petroleum trade of the future. Inspection of a map showing the petroleum reserves of the world disclose that many of these areas, particularly the most promising ones, are now closed to the entry of America, through being already possessed or controlled by the nationals of other countries—those of Great Britain and of Holland, especially. It is further disclosed that practically all of these areas, with the exception of Mexico, and parts of Central and South America, lie within British and French possessions or spheres of influence.

British and British-Dutch nationals practically control all of the world's petroleum industry that is not controlled by our own companies. Great Britain and British nationals are alive to the fact that production—production scattered all over the world—will be the dominating factor from now

on, and it is their plan to secure concessions, or other rights, covering these probable and possible oil-productive areas. Unless Americans are encouraged to go abroad and secure at once rights and privileges to produce oil from the world's fast-dwindling reserves that are not open to them, future oil production will all be in the hands of other nationals within the next few years. No greater and more lasting and far-reaching service can be rendered to this country at the present time than making possible and effecting the securing by or for American citizens their rightful participation in the development of all of the world's reserves of petroleum.

American Progress in Spanish Industry *

Great Britain Concerned Over the Position Held by American Machinery, Particularly in the Mining Fields—Spanish Iron-Ore Reserves

THE British authorities are worrying over the progress which American steel industries are making in Spain. Copies have reached the United States of an interesting document issued by the British Department of Overseas Trade concerning conditions and prospects of the iron and steel industries and engineering projects in Spain.

The report, which has been prepared by William Thomson Anderson, deals at great length with the activities of Americans in Spain seeking trade, and cites numerous instances where the British have lost trade. It also calls attention to the fact that American trade papers have gained wide acceptance in Spain and are proving of immense value in establishing American goods in the minds of Spaniards. The report refers specifically to *The Iron Age*, declaring that it is found everywhere among miners and the manufacturers of iron and steel goods, building materials and hardware. It also refers to the *Engineering and Mining Journal* as being universally taken by managers and owners of Spanish mines. As a result, the demand for American mining machinery and equipment is great. Mr. Anderson recommends a similar propaganda for British goods.

SPANISH IRON-ORE RESERVES

	Tons
Viscaya—All mines fully exploited	60,000,000
Guipuzcoa and Navarra—Partly exploited	10,000,000
Santander—Exploitation almost complete	30,000,000
Oviedo—Exploitation insignificant	60,000,000
Lugo—Exploitation partial	65,000,000
Estremadura, Segovia, etc.—Not yet exploited	10,000,000
Leon—Wagner, Ferradillo, Monte Teleno, etc.—Not yet worked	300,000,000
Huelva—Exclusive of sulphur ores unimportant	20,000,000
Sevilla—Exploitation unimportant	33,000,000
Malaga—Exploitation partial	30,000,000
Almeria—Exploitation important	30,000,000
Murcia—Exploitation limited	15,000,000
Teruel—Exploitation large	150,000,000
Ciudad Real—No exploitation as yet	10,000,000
Catalonian provinces—No exploitation as yet	15,000,000
Aragon—Exploitation partial	40,000,000
Logrono—Exploitation none	20,000,000
Total tonnage	900,000,000

In the Asturias, which is the center of the most active development and production of coal in Spain at the present time, Mr. Anderson believes that there is in prospect an immediate demand for boilers, briquetting machinery, washing and screening plants, lubricating oils, iron and steel pipe, iron and steel bars, nails, and similar requirements, hoisting engines, air compressors, cranes for loading ships, steam, compressed air, and electric haulage engines, explosives, shop tools, hardware, light railway equipment, locomotives, miners' tools, pulleys, all kinds of rolling stock, ropes, safety lamps, ventilating fans, and auto-meter weighing machines.

*Extract from *Iron Age*, August 21, 1919.

Concerning iron, Mr. Anderson gives an optimistic report based upon figures collated by Julio de Lazurtegue in 1918. The accompanying table shows in condensed form the estimated quantity of iron ore unmined and the state of development and operation.

The Germans had been taking ores that were relatively high in phosphorus. The English, on the other hand, demand ores very low in both phosphorus and sulphur. They, however, tolerate considerable amounts of silica, and are content with comparatively low per cents of iron in the ore.

Mr. Anderson maintains that Spain is destined to reach an annual output of 1,500,000 tons of pig iron. Before the war it was approximately 450,000 tons, and during the war it increased to nearly 700,000 tons. Of this amount 60 per cent was produced by the great Spanish concern called the Altos Hornos de Vizcaya at Bilboa. Other large contributors to the total were the Fabrica de San Francisco, of Bilboa; Fabrica de Nueva Montana, of Nueva Montana, Santander; and the Fabrica de Mieres, of Mieres, Asturias. The iron and steel business in Spain is fairly well organized into the steel syndicate known as the Central Siderurgica, comprising the following concerns: Altos Hornos, Duro Felguera, Fabrica de Mieres, Fab. de San Francisco, Fab. de Moreda y Gijon, Fab. de Bidasoa, Hijos e Romualdo Garcia, Santa Ana de Bolueta, Sociedad Material para Ferrocarriles, and the Union Carrajera.

Referring to mining machinery, Mr. Anderson directs especial attention to the aggressive and successful work accomplished in Spain by the Ingersoll-Rand Co., of New York, which he thinks gained a strong lead in Spain for air compressors and rock drills of all kinds. The Sullivan Machinery Co., New York and Chicago, also has done business in Spain. It appears that the Americans have practically absorbed the compressor business in this country, to the exclusion of others. Also, America takes the lead, according to Mr. Anderson, in steam shovels. The Rio Tinto mines in Huelva have seventeen Bucyrus shovels at work, these ranging from 65 to 100 tons, loading up to 2,500 tons per ten hours.

Crushing machinery for the mines, however, is mainly British and German. Copper converters are almost exclusively supplied by the Power and Mining Machinery Co., which company also furnishes other mining machinery in Spain. Ore cars are supplied to the Spanish mines mainly by the German firm of A. Koppel & Co.

Determining Water Ratio in Flotation Pulp At Anaconda

Anaconda copper concentrator flotation equipment receives its feed directly from the overflow lip of the Dorr classifiers, each operating in closed circuit with one Hardinge ball mill. The mill feed is the reject from the Wilfley table section of the concentrator. There is no stabilizing system between the Wilfley tables and the Hardinge mills. As a consequence, the ratio, water to solids, varies considerably, as the rate of feeding the ore varies. The only control possible is to divert as much as possible of the table head water to the slime-thickening tanks.

For the above reasons no regular determinations of water to pulp ratio are made, and there is no attempt to maintain a constant ratio. It has been found that 18 to 23 per cent solids in flotation feed give the best

results. With a lower percentage of solids the tailings are not improved and the grade of concentrates is lowered; above 23 per cent solids the concentrates are improved at the expense of the tailings.

At the slimes-flotation plant treating copper concentrator slimes (95 per cent —200 mesh), the slimes are thickened to about 16 per cent solids and then diluted with hot water to 10 per cent solids. The percentage of solids is determined by means of an ordinary sp. gr. hydrometer for liquids heavier than water. Each hydrometer is roughly calibrated by checking the percentage of solids as calculated from the reading against a weighed and dried sample of the pulp.

At the zinc concentrator the feed to the Hardinge mills is the undersize of 1½ by 12 mm. trommels. The ratio of water to pulp is maintained at the minimum amount required to carry the pulp in the launders from the crushing to the grinding division. The overflow from the Dorr classifiers goes direct to the flotation division and is thinned by the cleaner tailings and return flotation middlings. The rougher concentrates are about 30 to 35 per cent solids and are thinned to about 20 per cent solids by means of the clear overflow from the thickening tanks.

Engineer Urged for I. C. C.

Engineering Council Sends Letter to the President Requesting Appointment—Technical Knowledge Required

ENGINEERING COUNCIL, of which J. Parke Channing is president, has written President Wilson urging that a member of the engineering profession be appointed to the vacancy on the Interstate Commerce Commission. The letter is as follows:

The transportation systems of our country are largely the creations of its professional engineers. This statement can be made without disparagement to the statesmen, the financiers, the manufacturers, the lawyers, the educators, the mechanics, the laborers and many others, who, with the engineers, have contributed to the development of transportation. Through all stages of preliminary exploration, final survey, construction, upkeep and operation, in financial management, and in adjustment of the relations of transportation to the public, the genius and knowledge of the engineer are essential. Not only in technical physical matters, but also in determinations of policy, his contributions have supplemented and must ever supplement those of other men. These declarations hold good for all the carriers of commerce, by rail, by highway, by water, by pipe-line, by wire, or by air. Hence, it follows that the body established by Government to regulate the commerce, the carriers and the ways of communication, embracing so many engineering features, should number among its nine members, men of engineering training and experience.

Engineering Council, being aware of a vacancy on the Interstate Commerce Commission, begs leave to request the Chief Executive that in filling this vacancy he give earnest thought to the selection of a man who, to his other qualifications, adds the training and experience of an engineer familiar with transportation problems.

Engineer members wisely chosen would bring to the investigations and deliberations of the Interstate Commerce Commission not only technical knowledge of great value, but also experience in executive duties, a judicial attitude gained through the direction of work under contracts, minds of analytical habit, familiarity with costs of construction and operation, experience in dealing with employees of many vocations, and integrity of thought cultivated by that inescapable obedience to the laws of Nature involved in the practice of this profession. The engineer's training fits him for that mode of thinking which is indispensable to impartiality of judgment. One important function of the commission is valuation of public utilities and another is the determination of relationships and responsibilities of the management of such utilities to the public. No other body of men has given so extensive and so scientific consideration to these matters as have members of the engineering profession.

Council's purpose is not to further the interests of any individual or group, but solely to serve the nation by strengthening one of its most important regulatory bodies. Upon the wisdom, intelligence and courage of this commission depends in large measure the commercial welfare of the country. It is believed that the engineering profession can and should contribute to the country's well-being through the channel of membership in the Interstate Commerce Commission.

Very respectfully,
J. PARKE CHANNING, Chairman.

Notes on Luxemburg's Steel Industry In 1914 to 1918*

Effects of the War—Germany Benefited Greatly Through Control of Output of Iron Plants Running to Full Capacity in 1915 and 1916

BY ANDRÉ SURNY DE BONNIER
Mining Engineer, Liége, Belgium

THE critical state of the iron market in 1913, particularly in Belgium, caused a curtailment in the iron industry in Luxemburg at the end of 1913. The need of iron and steel in the Balkans was great, but the financial condition of these countries was deceptive. Furthermore, the negotiations opened in Dusseldorf at the Stahlwerk Verband, the difficulties between the United States and Mexico, and the absence of business in the Orient were the principal reasons for the inactivity of the market.

Mining statistics show a decrease in production of 3,200 metric tons of ore per day in Luxemburg during the first half of 1914, compared with the corresponding period of 1913. When the war broke out, operations stopped abruptly, only the men necessary to protect the mines being kept at work. By Aug. 10, 1914, of 5,400 laborers, 4,130 had been sent away. But by December, 1914, almost 80 per cent of them had been taken back.

During 1915 all male labor was employed, and it became difficult to find trained men by the second half of the year. The same situation existed during 1916 and the first part of 1917. In consequence, there was an increased use of machinery and mechanical devices of all kinds, the average production per man likewise increasing.

The price of ore, sold in 1913 at 3 fr. per ton, increased monthly. From 3.21 fr. in 1914 it rose to 4.50 fr. by August, 1915, for calcareous ore carrying 30 per cent Fe, and 3.90 fr. for siliceous ore with 35 per cent Fe. In 1917, calcareous ore was quoted at 5 fr., and siliceous ore sold up to 6.5 fr. At the end of 1917, the total extraction of ore was 30 per cent less than in 1915, because of the greater use by German blast furnaces of ore from the district of Briey, which is richer than the minettes of Luxemburg.

The iron resources of Luxemburg were a great help to Germany. More than 25 per cent of the total production of minette in 1913 was exported to countries independent of the Zollverein, but in 1915 less than 3 per cent was exported to these countries.

*Data taken from yearly reports of the Chambre du Commerce, of Luxemburg.

In August, 1914, the metallurgical plants became as greatly disorganized as the mines. During the first week of August, forty-two out of fifty furnaces were shut down. The Germans having removed the railroads for military use exclusively, the plants could not receive the coke required to keep them in operation. However, this abnormal situation did not last long, and in December the production of pig iron was 111,523 metric tons, or nearly one-half of the normal production. During 1915 and 1916 the plants ran at full capacity, the production being slightly lessened at the end of 1917.

Hoover Banquet Arranged

General and Executive Committees of the American Institute of Mining and Metallurgical Engineers Appointed by President H. V. Winchell

HERBERT HOOVER expects to arrive in America some time before the middle of September—the exact date to be determined by cable from him.

The engineers of America, under the auspices of the American Institute of Mining and Metallurgical Engineers, have decided to express their admiration for Hoover's services during the last five years, in international affairs, by giving him a large dinner, to be held in New York, shortly after his arrival. Mr. Hoover expects to go to his home in California, where he will resume his practice of engineering.

An organization has been completed consisting of a general committee and also an executive committee appointed by President Winchell of the A. I. M. E.

The personnel of the executive committee is as follows:

W. L. Saunders, chairman,	M. L. Requa
Chas. F. Rand, vice-chairman,	E. G. Spilsbury
E. P. Mathewson, treasurer,	Edgar Rickard
Albert C. Ludlum, secretary,	Edward B. Sturgis
B. B. Thayer	Arthur Williams
A. R. Ledoux	Horace V. Winchell
E. E. Olcott	J. Parke Channing

W. L. Saunders is also chairman of the general committee with Charles F. Rand and E. P. Mathewson as vice-chairmen.

August Mining Dividends

Dividends disbursed in August, 1919, by 15 United States mining and metallurgical companies making public reports amounted to $5,702,821, compared with $10,320,109 distributed by 21 companies in August, 1918. Canadian and Mexican companies paid $626,514, as compared with $1,980,163 a year ago.

United States Mining and Metallurgical Companies	Situation	Per Share	Total
Am. Zinc, Lead & Sm., pfd	U. S.	$1.50	$120,810
Anaconda, c.s.z	Mont.	1.00	2,331,250
Arizona Copper	Ariz.	.18	227,000
Barnes King, c.g	Mont.	.05	20,000
Caledonia, l.s	Ida.	.01	26,050
Chief Cons., l.s	Utah	.06½	57,475
Cresson Cons., g	Colo.	.10	122,000
Golden Cycle, g	Colo.	.03	45,000
Homestake, g	S. D.	.50	125,580
Internat. Nickel, pfd	U. S.-Can.	1.50	133,689
Miami, c	Ariz.	.50	373,557
Mohawk, c	Mich.	1.00	100,000
New Jersey Zinc	U. S.	4.00	1,400,000
United Eastern, g	Ariz.	.07	95,410
United Verde Ex., c	Ariz.	.50	525,000
Canadian and Mexican Companies			
Amparo, g	Mex.	.05	100,000
Coniagas, s	Ont.	.12½	100,000
Hollinger, g.s	Ont.	.05	246,000
McIntyre Porcupine, g.s	Ont.	.05	180,514

The only holding company to pay in August, 1919, was the White Knob Copper and Development Co., preferred, which disbursed 5c. a share ($10,000).

The totals of the first eight months of the year are as follows, the year 1918 figures being given in parentheses: Mining and metallurgical companies, $61,466,935 ($105,848,575); Canadian, Mexican, Central and South American companies, $10,402,370 ($13,573,665); holding companies, $910,005 ($1,425,005).

Occurrence of Iron and Nickel On Celebes Island

The British Bureau of Mines has issued a mimeographed report of eleven pages on the manganese-chrome iron ores and the nickel ores occurring in the Verbeek Mountains of Central Celebes and on neighboring islands. Celebes lies on the equator, south of the Philippines and east of Borneo. The iron ores are of the same type as those found in Cuba. There are four fields in Central Celebes, containing approximately the following number of tons of massive ore: Larona, 7,500,000; Lingkona, 1,500,000; Lingkobale, 1,500,000 and Karipenan, 1,300,000. Two analyses, the highest and the lowest, from the Larona field, showed the following results:

ANALYSES OF LARONA IRON ORE

	Per Cent	Per Cent.		Per Cent.	Per Cent.
Loss on ignition	12.2	15.4	Al_2O_3	7.0	10.8
SiO_2	0.5	0.8	Cr_2O_3	1.7	2.3
Fe_2O_3	70.1	73.6	MgO	0.3	0.4
Mn_3O_4	1.5	2.0	P_2O	0.08	0.11
NiO	0.3	0.6			

These and other deposits on neighboring islands may be summarily described as follows:

1. *Deposits of the Verbeek Mountains.*—Quantity of ore estimated at 1,000,000,000 tons; 200,000,000 proved. Favorably situated. About 300,000 hp. available from the Mailili River.

2. *Kilone Dale.*—Hasty reconnaissance indicates considerable ore. Situated just across from an export harbor, more favorably than the territory in which Verbeek Mountain deposits occur; also better prospects for water power.

3. *Group of Islands in Laoet Straits.*—About 25,000,000 tons on Poeloe Soewangi, at the disposition of the government, and 300,000,000 tons on Poeloe Seboekoe, in private hands. Favorably situated near coal mine on Poeloe Laoet and convenient for shipment.

4. *Obi Islands.*—No data on ore, but in large amount. Not as favorably situated for power, but more so for export shipment.

Nickel deposits have been found in association with the iron ore, their origin being closely connected. They belong for the most part to the garnierite group of hydrated magnesium nickel silicates, such as are found in New Caledonia. Two experimental pits in a nickel deposit at Soroako, on the south shore of Lake Katano, gave throughout a depth of 9 and 12 m., respectively, an average content of 2.3 and 2.5 per cent Ni. Eleven pits on Nendjangan hill average 2.5 to 3.0, and 21 pits and trenches on Boetoh hill averaged over 5 per cent Ni. The total amount of this ore was estimated at 60,000 tons, but 1,000,000 cu. m. of material would have to be removed in development. Several other essentially nickel deposits are known, and, as has already been mentioned, the iron ore is nickeliferous. The investigations are being continued.

Tungsten Ore Imports into the United States in June, 1919, amounted to 338 long tons. The countries of origin and amounts were as follows: Chile, 136 long tons; Peru, 99; Japan, 53; Argentina, 50 long tons.

BY THE WAY

Alluring Gold

"It is surprising how many people are duped into buying spurious bars of gold," said the *Ironmonger* recently. "Hundreds of pounds have been paid for single bars of what afterwards proved to be brass. It is quite a weekly occurrence; the 'sharps' on the lookout for pigeons to pluck frequent liquor bars, and sometimes pose as pioneers and prospectors who have 'struck 'ile.' There is much secrecy observed, and all sorts of subtle excuses. Sometimes the bars have a film of gold and pass the acid test. On Mar. 7 a member of the Provincial Council was duped, he alleged, to the tune of £200 for a bar of alloy of 63 per cent copper and 37 per cent zinc, the lot said to be worth 1s. 6d. It was palmed on to him as South African Republic gold, which is of lighter color."

A Matter of Habit

"There gaws tha bloody whistle naow a'blawin' like some creature possessed," says Cap'n Dick. "But I tell e, m'son, 'er do 'ave a powerful h'influence on these 'ere chaps oo works daown in tha bal. W'y, dam-me, they h'eats, works, an' sleeps by un, an' days w'en there's no blaw to 'er, don't seem as 'ow tha boys be themsel's. I suppose any 'abit be pretty much tha same, an' once a man's formed un, it's bloody 'ard to break 'is ways. An' 'e naws it, m'son. H'out in Butte nummer o' years h'ago—thinkin' on this 'ere whistle reminds me o' this story—tha pastor o' one o' tha churches figger'd as 'ow 'e'd raise enough money to buy a bell to 'ang in the belfry so that Sunday moornin's tha sexton could ring un, an' let tha boys naw w'en to come to church. So h'out 'e starts collectin'. Some o' tha boys gave 'im one day's pay an' some wuz more liberal. Finally 'e come to Jan Tregar, oo, min' you, was'nt one o' these 'ere stingy chaps but 'e wants to naw jus' w'ere 'is money's gawin' to. So tha preacher tells 'im. 'Oh gos along, reverend,' says Jan, 'W'ot thee wants is not a bell, thee wants a bloody 'ooter. Tha boys is more like to turn h'out w'en they 'ears 'er a'blawin'.' An', dost thee naw, m'son I do believe a whistle might be more persuadin' to some, jus' from force o' 'abit."

D. E. A. C.

A Tribute to Oil

An oily tongue maketh smooth speech, and the following from a Texas broker does not require sand papering:

Mineral oil is liquid sunshine. The sun itself may be an incandescent globule of oil. Forests of ancient ages locked in the earth are solidified sunshine. Oozing from them through eons of time is crude petroleum gathered into vast subterranean lakes and rivers. Man has tapped those reservoirs, refined their products and restored the liquid sunshine again to illuminate, lubricate, glorify and bless the world.

Oil is 85 per cent carbon; so is the sun. It is 15 per cent hydrogen; so is the sun. The body of every animate being on the earth, above the earth and in the sea contains and is dependent upon this liquid sunshine or oil. All vegetation contains and is dependent upon oil as a life element. Cut off all oil and the earth would be a cemetery in ninety days.

Every bit of machinery, every wheel, shaft, spindle and cog in the industrial world depends upon oil to move. Every engine, ship and aeroplane would stop but for oil. Not a banking house, factory, store, office, shop could open in all the marts of trade if there was no oil. Not a church, schoolhouse, theater, movie or game could bless, educate, give pleasure, delight and recreation without oil. No hospital or sickroom could offer hope of health without oil.

The oil springs of Is, on the banks of the Euphrates, that furnished oil for the building and glorifying of Ninevah and Babylon, are still running. There is an oil spring in the Ionian Islands that has flowed for over two thousand years. The oil wells of Rangoon have supplied over 400,000 bbl. of oil annually for more than ten generations. There are oil wells in Burkesville, Ky., that have flowed since 1826. Other wells in Oil Creek, Pa., which have flowed since 1858. You should worry.

Put your ear to the ground. Do you hear the march of industry? It is oilward. In the next twenty-five years the demand for oil and oil products will be more than double that of today. There is no substitute for oil. It can't be done. Oil is in a class by itself. If you wish to be in the march of progress, be abreast of your times, be one in the front ranks of success, and win wealth, power and honor, become an active investor and promoter in the oil industry. There are a few choice seats with the winners left. Cut out doubt, unbelief and distrust; go in now.

Get your oil and be in at the feast.

Rocks and Literary Indigestion

A San Francisco contemporary seems perturbed because a reporter referred to a mine as being in the ideal geological formation of "anthracite and porphyry," and takes pains to suggest that rock conditions at Tonopah indicated that perhaps "andesite" was meant. Had the reporter (or the compositor) taken the trouble to consult the *Mining & Scientific Press* of June, 1908, p. 23, he could have found a plausible pretext for the error in an article by C. W. Purington on Treasure Mountain, in the Eureka mining district of San Juan County, Col. In speaking of the outcrop of the big vein on the Cinnamon fault, the author says that it resembles a wide series of alternate bands of quartz and anthracite coal. A careful reader might notice that the coal effect is due to weathered rhodonite. Still more interesting is the allusion to the crosscut in the Gold Prince mine, where a solid wall of rhodonite 30 ft. wide resembled a wall of pink ice cream. In these days of the cost of high living becoming so burdensome, why should reporters neglect opportunities? Horse-flesh ore might do for folk who are not too squeamish, while kidney ore suggests stunts with a chafing dish. Peacock ore would serve for a Sunday or company dinner. Honey stone, ground to proper size, should prove a boon to dishonest grocers. And so on, *ad nauseam*. About twenty-five years ago Prof. J. F. Kemp was on a geological jaunt in the Franklin Furnace district of New Jersey with a group of students. Among other specimens gathered were some interesting pieces of banded willemite, calcite and rhodochrosite that looked something like slabs of chocolate-vanilla-strawberry at a Sunday-school picnic. The sight of them actually spurred the appetite (not the greenish hexagonal crystals) and an approaching baker's wagon was hailed with glee. By a phenomenal coincidence the food vendor's only stock consisted of some cake that was gotten up as a camouflage for ice cream, being in streaks of brown and white and vivid pink. Thinking that the professor also might be hungry, several of the boys proffered chunks of the treasure trove. Taking a slice in one hand, "Jimmie" compared it with a rock that he had been looking over. With a merry twinkle in his eyes the pious geologist remarked "I asked for stones, and ye gave me rhodochrosite cake."

PERSONALS

CHARLES L. PARSONS, mineral technologist of the U. S. Bureau of Mines, has returned from Europe where he has been making an investigation of a number of chemical processes. Dr. Parsons was also in attendance at the London and Brussels meeting of the Interallied Chemists.

F. F. Sharpless is in Tennessee on professional business.

A. W. Grierson has been appointed manager for the Kirkland Combined Mines, Ltd., at Kirkland Lake, Ontario.

Edwin J. Collins has returend to Duluth from Cobalt, Ontario, where he has been on a ten days business trip.

R. L. Chase of Denver, Col., has returned from examining properties at Lake City.

L G. Harris, general manager of the North Davidson Mining Co. of Porcupine, has gone to England with the object of raising funds for development.

C. L. Colburn was in several districts of Colorado recently, including Breckenridge, Leadville, Cripple Creek and Denver.

F. A. Thomson, dean of the school of mines of the University of Idaho, has concluded a tour of all the mining districts in southern Idaho.

R. R. Rose has resumed his duties as assistant secretary of the Canadian Mining Institute after an absence of nearly five years on military service.

W. F. Gowans is now in charge of the underground work at the Miller Independence Mines at Boston Creek, Ontario.

M. L. Requa contributed a comprehensive article to the Washington Star, Aug. 24 on the subject: "Striking at the Root of the Profiteering Evil."

Ellsworth Y. Dougherty has been appointed mining geologist in Southern Oregon for the Oregon Bureau of Mines and Geology.

J. E. Perrault has been appointed Minister of Colonization and Mines for Quebec Province, in place of Honore Mercier, who becomes Minister of Lands and Forests.

H. M. Richmond, professor of geology at Williamsville, Liberty, Mo., has been making an examination of the Wyoming Mining Company's mines south of Lander, Wyo.

F. G. Cottrell, the assistant director of the Bureau of Mines, has returned from an extended stay in Europe, where he made an investigation into the general mineral situation existing there.

Olof Zetterlund, general manager of El Arco Mines Co., Sinaloa, Mexico, was in New York recently, and has gone to Denver, Col., to purchase mining equipment necessary for the operation of his properties.

Rudolph Gahl, consulting metallurgist, of Denver, is conducting experiments on the chloride volatilization process at the Utah station of the Bureau of Mines, on a copper-silver ore from Peru.

V. K. Ting, director of the Geological Survey of China, visited Washington recently. Mr. Ting intends to visit some of the Western stations of the Bureau of Mines before sailing from San Francisco on Sept. 26.

T. S. Carnahan, who has been appointed safety engineer for the Utah Copper Co. recently, made a trip to Arizona and New Mexico for the purpose of investigating steam shovel operations.

Seth S. Langley will change his headquarters from Los Angeles, Cal., to San Antonio, Texas on Sept. 15. Mr. Langley expects to be actively engaged in Western Texas, and the Gulf Coast district as a petroleum technologist.

CHARLES L. PARSONS

Irving A. Palmer and **Samuel Z. Krum,** of the metallurgical department of the Colorado School of Mines, recently made a tour of inspection of the ore dressing plants in the San Juan district.

H. C. Parmelee, Howard R. Ward, H. H. Stoek, Charles W. Merrill, S. A. Taylor, Frederick G. Clapp, Ralph Arnold and **Kenneth Seaver** constitute the advisory committee of the International Exposition of Mining Industries.

John Seward of 152 Halsted St., East Orange, N. J., having been discharged from the Army, has been appointed manager of the El Salvador Silver Mines Co., Inc., with properties in El Salvador, including the Butters Divisadero mine.

James Freeburn, general manager of the Chicago Mining Co., and **George Oswell,** general manager of the Ebner Mining Co., have returned after a northern trip in the course of which they inspected properties in which they are interested.

SOCIETIES

American Mining Congress will hold its Twenty-second Annual Convention in St. Louis, Mo., Nov. 17 to 21.

Colorado Scientific Society has issued the year book dated Jan. 1, 1919, containing the constitution, officers for the present year and a list of members.

Canadian Mining Institute, as a result of the recent balloting of the members, will be known as the Canadian Mining and Metallurgical Institute, or the Canadian Institute of Mining and Metallurgy, as the council shall determine. The total number of votes polled was 435, of which 343 were affirmative. On the proposal to create a new class of "Professional Members" there were 248 affirmative and 15 negative votes.

Colorado Metal Mining Association and the Colorado Chapter of the **American Mining Congress** jointly held a banquet in honor of Van H. Manning on Aug. 25 at the Denver Club. George M. Taylor, president of the Portland Gold Mining Co. was toastmaster. Dr. Manning spoke on "Coöperative Effort in Development of Our Mineral Resources." Other speakers were Bulkeley Wells, D. W. Brunton, and R. B. Moore.

Chemical, Metallurgical, and Mining Society of South Africa has elected the following officers and council for the ensuing year: President, James Gray; vice-presidents, J. Chilton, G. A. Watermeyer, and A. Whitby; treasurer, J. R. Thurlow; members of council are H. R. Adam, R. A. Cooper, C. J. Gray, C. H. Greathead, H. C. Hilton, J. H. Johnson, A. King, J. J. R. Smythe, F. W. Watson, F. Wartenweiler, E. M. Weston and H. A. White.

The Institute of Metals, London, England, will hold a meeting on Sept. 24 and 25 in Sheffield. The program will include visits to industrial plants, inspection of the University of Sheffield, and the presentation of a number of papers, followed by discussions. Among the papers are the following: "The Ternary Alloys of Tin-Antimony-Arsenic," by J. E. Stead; "Graphite and Oxide Inclusions in Nickel Silver," by F. C. Thompson; and the "Solidification of Metals From the Liquid State," by C. H. Desch.

Winnipeg Mining Association. On Aug. 21 a meeting of mining men was held in Winnipeg, Man., and an organization effected. The membership includes mine and claim owners, shareholders of existing companies, brokers, and financiers. The objects of the association are to encourage legitimate mining enterprises, to secure reliable information, to obtain government aid in the building of roads and other public improvements, and to establish rules governing the sale of mining shares and claims. The following officers were elected: J. Murray Baird, president; John Beckman, vice-president; J. Mur-

ray Baird, John Connor, and W. Tobias, directors. The association proposes to establish a bureau of information where the public can obtain accurate data regarding mining developments.

INDUSTRIAL NEWS

The Michigan Smelting & Refining Co., of Detroit, has opened a branch office at Pittsburgh, 945 Oliver Building.

N. S. Thulin has been appointed special railroad representative on the staff of S. C. Sprague, manager of Western railroad sales for the Chicago Pneumatic Tool Co.

S. F. Bowser & Co., Fort Wayne, Ind., has issued a circular which describes a storage system for lubricating oil. The system permits the addition of more units when required.

B. F. Goodrich Rubber Co. announces the appointment of F. O. Slutz as manager of the railroad sales department, effective July 1, succeeding C. M. Woodruff, who resigned to accept a position with Akron Board of Education.

Collins & Webb, mining machinery merchants, of Los Angeles, announce the removal of their general offices and salesroom to 447-449 East 3d St., Los Angeles, Cal., where they will have much larger space and facilities.

Coast Equipment Co., Merchants' Exchange, San Francisco, Cal., has been appointed representative of the Atlas Car and Manufacturing Co., for California and Nevada. All inquiries from this territory should be addressed to them.

Green Engineering Co., East Chicago, Ind., announces the appointment of E. L. Sullivan to represent the company in the Pittsburgh district including western Pennsylvania, eastern Ohio and western West Virginia. Mr. Sullivan will maintain the present offices at 2545 Oliver Building, Pittsburgh.

Wood Equipment Co., Chicago, Ill., will change its name to Car Dumper & Equipment Co., better to represent the nature of its business, but no change will occur in the active organization. The principal products of the company are rotary dumpers for mine and railroad cars.

The Overstrom Manufacturing Co. announces that its Los Angeles factory and offices have been closed, the factory having been moved to Berkeley, Cal. This company therefore requests that all communications be sent to its main office, 1,215 First National Bank Building, San Francisco.

The Griscom-Russell Co., 90 West St., New York, has placed on the market the G-R Duplex strainer, designed for installation in the suction or discharge lines of lubricating or fuel-oil systems for the removal of solid foreign material in suspension. This strainer is also suitable for straining the water supply from such sources as rivers and lakes. This apparatus is described in Bulletin 1,150 published by the manufacturer.

"Industrial Transportation" is the title of a pamphlet issued by the Bicycle Manufacturers' Association, Hartford, Conn., which claims the bicycle is the lowest cost means of transportation and is the solution of the problem of carrying workmen to and from their places of employment. Letters from employers are included, attesting to the adaptability of the bicycle for this purpose. Joseph Goodman is secretary of the association.

TRADE CATALOGS

McCool Pulverizer The McCool Co., Cleveland. Ohio: Bulletin 49; 7 x 10; 16 pp.; illustrated. Describes a pulverizer for laboratory or assay work. A capacity of reducing one pound of material to 100 mesh in 30 seconds is claimed for the 9½ K size.

Surveyors' and Engineers' Instruments The A. Lietz Co., 61 Post St., San Francisco, Cal. Catalog; 6¼ x 9¼; 612 pp.; illustrated. Contains a list of the instruments manufactured by the company and a large number of engineering books and publications. The company also carries a large stock of other manufacturers' goods.

Excavating Machinery. The Marion Steam Shovel Co., Marion, Ohio. Catalog 188; 5½ x 8; 64 pp.; illustrated. Describes the excavating machinery manufactured by the company, which includes steam shovels, dredges, and kindred equipment. Tables of specifications and working diagrams are included.

Automotive Electrical and General Supplies and Garage Equipment. Hendrie & Bolthoff Manufacturing & Supply Co., Denver, Col. Catalog No. 50; 6¾ x 10; 488 pp.; illustrated. This comprehensive volume should prove valuable for reference to mining and metallurgical men. It describes a large number of automotive, electrical, and general supplies and garage equipment, with directions for ordering. Eleven pages are devoted to a cross index.

Marine Equipment. Llewellyn Iron Works, Los Angeles, Cal.; 7¾ x 11; 56 pp.; illustrated. Describes the manufacture of parts of marine engines, boilers, propellors, marine railways, cargo winches and many other similar products in the two plants at Los Angeles and Torrance, Cal. It is stated that practically everything entering into the construction of Llewellyn products is manufactured by the company. Open hearth steel furnaces, rolling mills and a grey iron foundry are in operation. The last three pages are devoted to a list of various kinds of machinery manufactured by the company, which includes a number of other fields besides the marine.

NEW PATENTS

U. S. patent specifications may be obtained from the Patent Office, Washington, D. C., at 5c. each.

Alloy of Copper, Nickel and Zinc. Foster Milliken. (1,310,363; July 15, 1919.)

Alloys—Method of Making Alloys of Aluminum, Magnesium and Uranium. Hermann G. C. Trofehrn, assignor to Light Metals Co. (1,310,309 and 1,310,310; July 15. 1919.)

Aluminous Materials, Process of Purifying. Otis Hutchins, assignor to the Carborundum Co. (1,310,342; July 15, 1919.)

Drilling—Percussive Engine. Wilhelm Mauss. (1,309,649; July 15, 1919.)

Electric Furnace. Otis Hutchins, assignor to the Carborundum Co. (1,310,341; July 15, 1919.)

Electrode Rack. John Spense Finlay, assignor to Anaconda Copper Mining Co. (1,311,958; Aug. 5, 1919.)

Flotation — Concentration of Ores. Harry Vernon Seale and Wilson Shellshear, assignors by mesne assignments, to Minerals Separation North American Corporation. (1,311,919, and 1,311,920; Aug. 5, 1919.)

Flotation — Ore-Concentrating Process and Apparatus. Edward Hopkins Emerson, assignor to Minerals Separation North American Corporation. (1,311,882; Aug. 5, 1919.)

Flotation—Sulphidation and Flotation of Ores. Raymond F. Bacon, assignor to Metals Recovery Co. (1,312,668; Aug. 12, 1919.)

Flotation Apparatus. Joseph P. Ruth, Jr. (1,309,219; July 8, 1919.)

Flotation Ore-Separating Apparatus. Alfred L. Blomfield, assignor to the Dorr Co. (1,310,051; July 15, 1919.)

Fuel Storage — Yielding Supporting and Vertically-Guiding Apparatus. William O. Renkin, assignor to Quigley Furnace Specialties Co. (1,308,370; July 1, 1919.)

Jig. James B. Barbee and Otto J. Cross. (1,312,429; Aug. 5, 1919.)

Nitrogen — Process of Recovering Combined Nitrogen from Blast Furnaces. Edward W. Haslup. (1,310,480; July 22, 1919.)

Open-Hearth Furnace. Albert Miller. (1,309,149; July 8, 1919.)

Ore-Cleaning and Concentrating Apparatus. Lewis H. Falley. (1,312,028; Aug. 5, 1919.)

Ore Separator. Owen Hawkins. (1,312,324; Aug. 5, 1919.)

Potash—Process of Producing Potassium Hydrate from Green Sand. Benjamin A. Peacock. (1,309,744; July 15, 1919.)

Potash—Treatment of Ores for Production of Metal and of Potassium Compounds. Charles Catlett, assignor to The British Potash Co., Ltd. (1,311,043; July 22, 1919.)

EDITORIAL CORRESPONDENCE

Current Events and Topics in Brief of Interest to Engineers and Operators

SAN FRANCISCO, CAL.—Aug. 28

Recent Mine Accidents in California were as follows: One man killed on July 16 at Carson Hill Gold Mine at Melones by skip jumping track, one killed by fall of rock on Aug. 4 at Plymouth Consolidated at Plymouth; one killed by falling on Aug. 11 at Pennsylvania mine, Tuolumne.

Comstock Northend Mines at Virginia City, Nev., produced 2,132 tons, valued at $67,438, for the four weeks ended Aug. 23. Of this Consolidated Virginia produced 1,113 tons valued at $24,817 and Ophir 1,017 tons valued at $42,621. Twenty-seven bars of bullion were shipped to the San Francisco mint.

A Mine Rescue Station will be established at Berkeley, Cal., in connection with the University of California, providing the board of regents will make provision therefor at its next meeting. Following a recent conference between Van. H. Manning, director of the U. S. Bureau of Mines, with Dean F. H. Probert, of the department of mining of the University, it was said that the university would probably be selected as the location of the station. A Congressional appropriation of $25,000 has been made for such a station in California. The station will have charge of mine-rescue work in the state and Government engineers will be in charge.

RENO, NEV.—Aug. 30.

The Nevada Consolidated Strike at Ely ended Aug. 30 by men returning to work. The company will improve working conditions and establish a company commissary.

Speedy settlement of the strike at Tonopah and Divide, which has closed down all the mines at these places, seemed assured a week ago, both sides appearing confident. But, lately, the operators seem to be less favorably disposed, though speaking well of Joseph Lord, the Federal mediator.

At the urgent request of Governor Boyle, the Comstock miners, who had voted to strike to enforce their demands for a dollar a day wage increase, postponed going out until the governor's arrival. It is hoped that a settlement may be reached at a joint conference of the operators and miners with the governor.

NESPELEM, WASH.—Aug. 28

Silver Mining in the Nespelem District is displaying renewed activity. There are now six small producing companies in operation. Practically all are on a narrow mineralized belt running north and south two miles south of Nespelem. The district is hampered by high transportation costs, being 40 miles from railroad. This handicap has been largely met by the erection of an 80-ton flotation plant, owned by the Great Metals Mining & Milling Co. This plant first worked on local dumps carrying 10-20 oz. silver. The Great Metals company has just finished sinking its shaft to the 200 level and is ready to crosscut to get under a promising surface lead. The Double Head Mining Co., operated under bond and lease by B. S. Jenkins, of Seattle, has a crew of four men on development work. Beggs and Ostrowski are shipping 25 tons daily to the Great Metals mill from the Apache property two miles away. The Panama property, operated by H. B. Dickinson, of Seattle, has about 100 tons of ore in the bins. At the Andy O'Neil property a small crew is engaged. The Rebecca Mining Co., ten miles east of Nespelem, is diamond drilling its property.

BUTTE, MONT.—Aug. 28

The Suit Against Butte & Superior brought by the Clark Montana Realty Co. has been settled by compromise. By the stipulation of the agreement the Elm Orlu, which is owned by the Clark-Montana Realty Co., was awarded 186 ft. additional eastward on the Rainbow vein below 1,200 ft, and the Butte & Superior Copper Co. that portion above 1,200 ft. The Jersey Blue vein west of a new plane below 1.300 ft. is awarded to the Elm Orlu. Each side will pay its own costs. Butte & Superior closed last year with net current assets over all liabilities of $4,200,000. There remains now only the agreement upon damages which Butte & Superior must pay to the Minerials Separation Corporation, Ltd., for the infringement of the later's oil flotation patents. An acounting is now in progress in an endeavor to determine the extent of Butte & Superior's liability and the amount of damages it should pay. Return of these findings is scheduled for Oct. 29.

SALT LAKE CITY, UTAH—Aug. 30

Dr. Van. H. Manning, director of the U. S. Bureau of Mines, addressed the Utah Chapter of the American Mining Congress at a luncheon given in his honor on Aug. 21 at the Commercial Club in Salt Lake City. Dr. Manning urged the need of greater cooperation between the Bureau and mining men, looking to the day when the Bureau, at present receiving an annual appropriation of about $2,500,000, compared with the $30,000,000 given the Department of Agriculture, will be as important and well fostered as the latter. He also outlined the work of the Bureau on toxin gases, airplane bombs and helium gas during the war, and pointed out the need of increased production of petroleum in the United States.

A Solution of the Smoke Problem, recurring in Salt Lake City during the winter months, is being sought by the U. S. Bureau of Mines in co-operation with city officials, and by means of funds furnished in part by the government, and in part by the city. Dorsey A. Lyon, director of experiment stations of the Bureau, is in the city in company with Osborn Monet, consulting fuel engineer. Consultations with the city commission have been held, Thomas Varley of the local bureau also attending. S. Q. Canon, city engineer, will also take part in the investigation. It is planned first to look into the locomotive problem and high-heat pressure plants operating the year round to determine what percentage of the trouble is directly traceable to these sources, before the smaller plants and local furnaces start up for the winter. It is the purpose of the investigators to determine upon a sane and reasonable program of procedure without taking rash or drastic action.

DENVER, COL.—Aug. 23

The State Mines-Development Association of Colorado has opened offices in the Kitridge Building. This will be the headquarters for the central organization, which will co-operate with the subsidiary organizations in ten of the mining camps of Colorado. The president of the central organization is Lee M. Brokaw, who was its promoter. The chairman is W. F. Kendric, and R. R. Moody is treasurer. The Board of Engineers attached to this central organization are Forbes Ricard, Arthur J. Hoskin and M. E. Shuttleworth. These are all well-known engineers in Denver, and in co-operation with the mining engineers of the various subsidiary organizations will pass upon the advisability of each enterprise called to the attention of the organization.

HOUGHTON, MICH.—Aug. 28

Production of Copper from the mines of the Michigan district continues to depend entirely upon the labor situation. The influx of men has not as yet reached a point where it may be a strong factor in increasing the copper output. Mines of the copper country are also suffering from another set of circumstances over which they have no control. The law fixing the minimum age at which a boy can go to work in the mines is so drawn that mine managers are in doubt as to whether a mining company may hire boys under 18 years of age, no matter what class of work they are required to perform. Under the law they cannot go underground if less than 18 years of age and the opinion has been expressed that a mining corporation runs the risk of violating the law if it employs boys under 18 in any capacity whatever. The problem, therefore, from the viewpoint of the community, is a serious one. Practically the only industry in the copper country is mining and there are few other jobs in other lines at which these boys may work. There is no complaint about the state law. It would, however, in some cases be easier for the companies to get men and to keep them if it were possible for their sons to secure work in the same district.

AUSTIN, TEX.—Aug. 28

All Oil Companies must at once file reports with the Texas Railroad Commission giving full particulars regarding the organization, holdings, production, etc. Failure to comply with this law involves a penalty of $500 fine.

New Oil Refineries will be built at Galveston and Houston. Carson Petroleum Co. will build storage and terminal facilities at Galveston for suppying Missouri, Kansas & Texas R.R. Contract is for 3,000,000 bbl. yearly for five years. The railroad company will finance construction of terminals and conversion of locomotives to oil burners from $750,000 loan from the oil company, advanced for receiver's notes. Crude oil will be delivered from Mexico by steamers of the Mexican Petroleum Co. and the Pan American Petroleum Co. It is estimated the saving to the railroad by this change will be $3,000 daily. An application has been made to the city commissioners of Galveston for supplying Missouri, Kansas & where it is desired to build an oil refinery of 1,000 bbl. daily capacity. At Houston the Louisiana Petroleum & Refining Co. has purchased 37 acres on the north side of the ship channel, and will build an oil refinery at once of a daily capacity of 1,000 bbl. The Deep Water Refineries Co. has also secured land near Houston with a frontage of 600 ft. on ship channel, and will build an oil refinery, the first unit to have 1,000 bbl. daily capacity. R. A. Fouts, of Chicago, will be general manager, and C. W. Shearer, Houston, will be in charge of construction.

DULUTH, MINN.—Aug. 28

The Wash Ore Area of the western Mesabi Range continues to be the main feature of the development of this range. It is reported that negotiations have now been completed for the leasing of what is known as the Trumbull prospect by the Great Northern Ore interests to the Cleveland Cliffs company. A feature of wash ores which largely offsets their additional cost is their popularity with furnace men, and this feature probably accounts more than any other for the recent development of silicious orebodies. Finished wash ores compare very favorably chemically with the straight shipping ores from the other districts and the removal of a large percentage of fines in the process of washing transforms them into an excellent furnace charge.

BIRMINGHAM, ALA.—Aug. 26

A Strike at the Mines of the Sloss-Sheffield Steel & Iron Co. took place during the third week of August but was of short duration, being settled by the company granting the men's demand for a ten-hour day with eleven-hour pay. This is the plan now in vogue at the Tennessee Coal, Iron & Ry. Co.'s red ore mines and followed by the Republic Iron & Steel Co. at their mines on Red Mountain, the Woodward company being the only one on the south end of Red Mountain now operating on a straight ten-hour day.

Members of a Roumanian commission were in Birmingham during the third week of August conferring with officials of the Birmingham Steel Corporation relative to placing an order for a large tonnage of fabricated steel for bridge building. This steel is said to be for the purpose of replacing a bridge over a branch of the Danube River which was destroyed during the war.

NEW YORK—Aug. 26

The Directors of the Cerro de Pasco Copper Corporation at a meeting held Aug. 13 definitely authorized the construction of a new smelting plant at Oroya, Peru, the junction point of the Ferrocarril Central del Peru and the Cerro de Pasco Railway. The plant will consist of two blast furnaces and two reverberatories with necessary adjuncts. The estimated capacity will be about 2,800 tons of raw ore per day. It is hoped that the plant will be in operation early in 1922.

TORONTO, ONTARIO—Aug. 30

Much Survey and Exploration Work is being carried on this season in that part of Northern Ontario lying between the Transcontinental Railway and James Bay, which is expected to result in securing valuable information concerning the mineral and other resources of that region. Among the different parties in the field are a survey party of the Temiskaming & Northern Ontario Ry., completing survey for extension of the line and estimating the possible water power development; a party from the Ontario Bureau of Mines mapping the geology of the area; and a party sent out by the Canadian Geological Survey to investigate coal, clay and oil indications. A general description of the area will be given by James Stewart.

At Cobalt, a committee of business men has been attempting to bring about a settlement of the miner's strike, but without result. The mine managers have issued a statement defining their position. They say that "the present labor dispute has narrowed down to a positive difference of opinion as to whether or not the local branches of the Western Federation of Miners, now known as the International Union of Mine, Mill and Smelter Workers, should be recognized. On one side the union officials and the Minister of Labor insist that it must be recognized, and on the other side the mine managers are just as positive in their determination that the union will not be recognized. The mines which have now been shut down since July 23 are gradually filling with water.

The Ontario Government has interfered to put a stop to the expensive advertising of stock in oil companies of doubtful standing and prosecutions have been instituted against four promoters dealing in shares of such companies as follows: Glen Craig Tobias, Canada Petroleum & Refining Corporation, Ltd.; Thomas F. Fleming, Texas Producing & Refining Co.; O. J. B. Yersley, Texas Globe Oil Co.; and A. G. Rogers Dollar Oil Wells. They are being prosecuted under the Ontario Companies Act, which provides that a company before offering shares to the public shall file a prospectus giving full information as to the original incorporators, and directors, number of shares subscribed for, amount paid for property, commissions, preliminary expenses and other data, indicating the character and financial standing of the company. They were arraigned at the Toronto Police Court and remanded for one week, being released on bail.

VICTORIA, B. C.—Aug. 29

The Canada Copper Corporation has settled its dispute with its employees and operations will be resumed at once. The delay caused by the four-months' strike will prevent starting the concentrator before next spring.

Tests of the Fleet Electrical Smelting Furnace in handling British Columbia magnetite ores are taking place. The Provincial Government has supplied a quantity of ore from Texada Island for this purpose. One test made recently was witnessed by the Provincial mineralogist and other officials. While it was not as successful as might have been desired, others, it is understood, are to be arranged.

Vancouver Mining Development Syndicate has been organized with a capitalization of $500,000, of which $100,000 has been subscribed. The object is to bring mining prospects of British Columbia to the attention of the investing public. The syndicate plans to aid a prospector locating promising properties. Nicol Thompson, A. M. Whiteside, J. H. Greer, A. H. Wallbridge and A. Erskine Smith, all of Vancouver, B. C., are members of the board of the new organzation.

The Cariboo District of British Columbia is attracting the attention of men with experience in dredging operations in the Yukon. James Moore, one of the largest operators in the Yukon, is placing a dredge on Antler Creek, in the Cariboo. His associates have secured a promising placer tract on the Swift and Little Swift rivers, and, after preliminary investigations, have arranged to install a large dipper dredge. The Dominion Government, according to William Sloan, provincial minister of mines, is making a geological and topographical survey covering 16 sq.mi. of this section, the work centering at Harper's Camp. The International Dredging Co. has a machine operating with good results. At the junction of North and South forks of Horsey River a drag-line scraper is being put in by Victoria mining interests, whose experiment is being watched with interest.

LONDON, ENGLAND—Aug. 25

Chemical & Metallurgical Corporation held its statutory meeting in London on July 31, at which the report of the directors was presented, wherein it was pointed out that the contract with Frank Elmore had been completed, company acquiring the world rights of Elmore's patented invention for separating the lead and zinc-lead ores by an economical and efficient chemical process. The price paid was £25,000 in cash and £1,000,000 in ordinary shares. The chairman, Herbert Guedella, stated that the company is arranging to establish a plant in Great Britain for treating middlings and concentrates; that a supply of middlings from Australia has been contracted for; and that the company is negotiating further for a contract supply of raw material.

As regards the foreign situation of the patents it was stated that the Burma Corporation has an option to call for a license in Burma and India on certain terms. This option extends to May, 1920. The option with regard to the United States and Canada has been exercised, and calls for formation of a company with a capital of £400,000, of which the corporation will receive £200,000 in fully paid shares. The option with regard to Mexico and Central America has also been exercised, and the corporation will receive £115,000 in fully paid shares in a company with a nominal capital of £200,000. Another group has exercised the option with regard to Russia, Norway and Sweden, and in this case the company will receive £150,000 in fully paid shares in a company with a capital of £300,000. The company is completing an agreement for the establishment of a trial plant to demonstrate the process in Australia in connection with the chief mining companies there, and an agreement is almost completed with most important mining interests in France for the acquisition of the patents for France, North Africa, Spain, Portugal, etc. The option with regard to Southern Africa has not yet been exercised.

When the corporation was formed, Elmore also transferred to it the benefit of an option on the rights to the Francois cementation process for shaft sinking through waterlogged strata.

THE MINING NEWS

Progress of Mining Operations Condensed and Classified for Easy Reference

ALASKA

AT WILLOW CREEK about six gold properties operating with 100 men.

KENNECOTT (Kennecott) — Employing all miners available. Supply insufficient.

ALASKA GASTINEAU (Thane)—Laying off miners, who are being hired by Alaska Juneau.

JUALIN ALASKA (Jualin)—All bids rejected on large tunnel contract. Company doing work itself. Miners hard to obtain.

ARIZONA

Cochise County

ARIZONA UNITED (Johnson)—Kirby Thomas, of New York, inspecting this property.

COPPER CHIEF (Johnson)—Leased by Mines and Development Corporation of Arizona, which will build concentrator. Martin Fishback, manager.

EMPIRE (Johnson)—Being examined by D. G. Kidder, of Los Angeles, for California company.

O. K. SHAFT (Johnson)—Compelled to stop work on account of water. New pumps being installed.

Pinal County

MAGMA COPPER CO. (Superior)—Drill hole sunk 400 ft. below 1,800 level, and core indicates that last 47 ft. is in ore averaging 5 per cent copper, and 4 oz. silver per ton. Bottom of hole still in ore.

SILVER KING OF ARIZONA (Superior)—New shaft down 245 ft. On Aug. 27 sinking was speeded up by addition of third shift. Shaft has been equipped with new hoist and cable sufficient for sinking to 1,000-ft. depth. New compressor installed. Sinking under contract discontinued, and work being done on company account under direction of John Fowle, general manager. Mill now running three shifts. Mill heads average about 20 oz. silver per ton. Extraction by flotation reported to be well above 95 per cent.

CALIFORNIA

Nevada County

GOLDEN CENTER (Grass Valley)—Discovery of two-foot vein of good ore announced by E. A. Abadie, superintendent. Ledge encountered in crosscut driven 500 ft. west of shaft and opens up large territory to development.

UNION HILL (Grass Valley)—Hoisting plant being dismantled to be moved to Idaho Maryland ground.

CENTRAL CONSOLIDATED (Nevada City)—Property on Greenhorn Creek three miles south of town being reopened. Complete plant will be needed. Paul W. Smith, formerly superintendent, again in charge.

COLORADO

Boulder County

BOULDER COUNTY TUNNEL (Cardinal)—R. D. George, state geologist, and Fred Fair, ex-county surveyor, examining tunnel and mine for G. J. Clark, of Boulder, and Fred A. Spies, of Chicago, who have recently taken property over.

Eagle County

BAILEY COPPER (McCoy)—William H. Rathbun, of Minneapolis, Minn., and associates, recently purchased equipment to develop Bailey Copper mine at Copper Spur near McCoy. Ore copper carbonate in granular sandstone. Incorporated under name of Electro Copper Co. Planned to build leaching and electrolytic plant.

Park County

POWDER RIVER GOLD (Fairplay) — Excavations begun for largest gold dredge in Colorado. Company recently purchased large acreage on Middle Fork of South Platte River. Dredge to be entirely of steel and will have 9-cu.ft. buckets and capacity of over 3,000 cu.yd. a day. W. P. Hammon, of San Francisco, president. Operation will begin half mile below Fairplay.

Pitkin County

HOPE M. & M. (Aspen)—Tunnel advanced 76 ft. last month. Heavy water encountered, which may unwater upper workings. Mill being remodeled and power line extended to plant. Operation expected to start about middle of September.

San Juan County

SUNNYSIDE M. & M. (Eureka)—Mill again in operation. Daily capacity 500 tons. Property forced to suspend several months ago because of $250,000 fire which destroyed bunk and boarding houses. New bunk house built to accommodate 450 men, also big warehouse, commissary department, steam and crusher plant.

Teller County

EL PASO EXTENSION (Cripple Creek)—Plans to erect concentrator at Clara D shaft of old Lexington Gold Mining Co. Numerous blocks of ground leased and lessees developing milling ore. Some lessees reworking dumps.

PORTLAND (Victor)—Recently struck rich smelting ore when drifting on Lee No. 5 vein of Portland No. 2 shaft. Body five feet wide containing streaks from 1 to 3 in. wide of almost solid sylvanite. Discovery at 2,131-ft. depth below collar of Portland No. 2 shaft at Roosevelt tunnel level.

IDAHO

Boundary County

IDAHO CONTINENTAL (Porthill) — This property, 26 miles from Porthill, Boundary County, adjoining International boundary line, is concentrating 250 tons of ore a day, which in connection with its stock pile has afforded daily shipments of 60 tons of concentrates carrying 60 per cent lead and 22 oz. silver since July 22. Twelve motor trucks used in transferring product from mine to Porthill, a distance of 26 miles. The mine shows a very substantial ore reserve, has a large unproven territory of exceptional promise and in fact is one of the largest surface distributions of clean lead-silver mineral in Idaho outside of the Coeur d'Alene district.

LOUISIANA

ALUMINUM ORE CO. (Pittsburgh, Pa.) —Has purchased land at Baton Rouge, La., for shipping terminals.

MICHIGAN

Copper District

CALUMET & HECLA (Calumet)—Reclamation plant at Lake Linden recovering more copper than at any time before. Dredge working well. Additional flotation plant ready on Sept. 1. Hardinge mills being relined with Belgian flint bricks, first cargo having arrived.

FRANKLIN (Demmon)—Sinking operations continuing. Shaft now down 3,900 ft. and in footwall of Pewabic amygdaloid, mineralized portion of which may be reached by crosscut to west. Allouez conglomerate approximately 420 ft. east. Objective of present sinking operations to develop these two formations. There will be no 38th level. No plans made to resume production, but this may be done in short time if desired.

Gogebic Range

DOCKWORKERS' STRIKE at Ashland, Wis., settled Aug. 23 and mines on range resumed shipping promptly. At most of mines steam shovels also working and ore being rushed to docks as fast as boats can take it away.

AT IRONWOOD all mines and business houses in or near city closed Aug. 28 in honor of soldiers and sailors homecoming.

OLIVER IRON (Ironwood)—Has started surveys for transmission line from Pabst power house to Puritan mine. Construction will be rushed this fall.

PURITAN (Puritan) — Head wireman for power company electrocuted at mine sub-station while trying to rescue fellow workman caught on wet pole. Latter saved by the act.

MINNESOTA

Cuyuna Range

IDA MAE (Crosby)—Will increase boiler capacity. Complete electrification contemplated.

PORTSMOUTH (Crosby)—New open pit property of Coates & Tweed has completed uncovering large manganiferous orebody and in position to ship when market improves.

SAGAMORE (Ironton)—Winston Deare, contractors to John A. Savage Co., complete large stripping contract in which two drag line shovels were successfully used. Understood operators will continue hydraulic stripping. One shovel to load ore for balance of season.

Mesabi Range

SEVILLE (Buhl)—Shipping from stockpile. Underground property owned by A. B. Coates.

THORNE (Buhl)—Installation of compressor completed. Plans under way for electrification to provide for underground and stockpile haulage. Hanna Ore Mining Co., operators.

MONROE (Chisholm)—Oliver company dismantling old No. 2 shaft house. Fire recently destroyed power plant.

MAHONING (Hibbing) — Advantage taken of lull in shipments to continue stripping. Four shovel crews now adding to total of 11,000,000 cu.yd. of overburden already removed.

Vermilion Range

CONS. VERMILION & EXTENSION (Ely)—Property transferred to Phoenix Mining Co. C. Butler, of Butler Bros., president of new concern. Surface plant and development in good shape except that mine, which has had checkered career, requires unwatering.

MONTANA

Mineral County

TARBOX (Saltese)—Managerial board of three members of the directorate created, following disagreement between Wallace and Butte stockholders. Further development of ore suspended, as ample tonnage now in sight to warrant construction of mill. Assessments will probably be continued to finance proposed concentrator.

NEVADA

Clark County

YELLOW PINE (Goodsprings)—New mill completed, except calciner, and working steadily. Only one shift employed, but another will be added.

Humboldt County

IN SUNSHINE DISTRICT, W. S. O'Brien has stripped vein for 85 ft. on promising dicovery. Values largely in silver. Johnson-Baldwin property also shows high-grade in several openings. Ratliff lease on Gem Five has made several shipments. Lease equipped with good hoist, air compressor and jackhammer drills. Joe Shell has opened up good lead-silver ore on his property.

Lyon County

NEVADA-DOUGLAS (Ludwig)—Report just issued estimates company has 190,000 tons of sulphide ore in sight running between 3.05 and 3.5 per cent copper.

Mineral County

PILOT MOUNTAINS (Mina)—Bugg and Drew have opened up cinnabar ore, carrying gold and silver also, in 200 level of their mine 12 miles east of Mina. Three flasks of quicksilver being produced daily from ore on upper levels.

Nye County

WHITE CAPS (Manhattan)—Cleanup of White Caps mill for first half of August estimated at $15,750, which is richest cleanup yet made by property.

Pershing County

SEVEN TROUGHS COALITION (Lovelock)—Mill, which has been running on ore from old dumps and tailings, has closed down and camp practically deserted.

ROCHESTER SILVER MINES (Lower Rochester)—Under direction of Charles D. Kaeding, general manager, and C. A. Bennett, superintendent, about 1,000 ft. of development work being done each month on company's three mines, the Rochester Mines, Rochester Merger and Nenzel Crown Point. Good milling ore found on 1,000 level, where there was little showing before. Ore has been picked up beyond fault on 900 and 1,000 levels, new orebodies being in virgin ground. Transportation tunnel relaid with heavy steel rails and heavy electric motors installed. Improvements being made in Rochester mill expected to result in saving of from $2,500 to $3,000 per month and to increase capacity to 160 tons per day.

Washoe County

STANDARD METALS (Reno)—Flotation plant running steadily. Capacity estimated 75 tons per 24 hours. Erected under supervision of "Garve" Logan.

OKLAHOMA

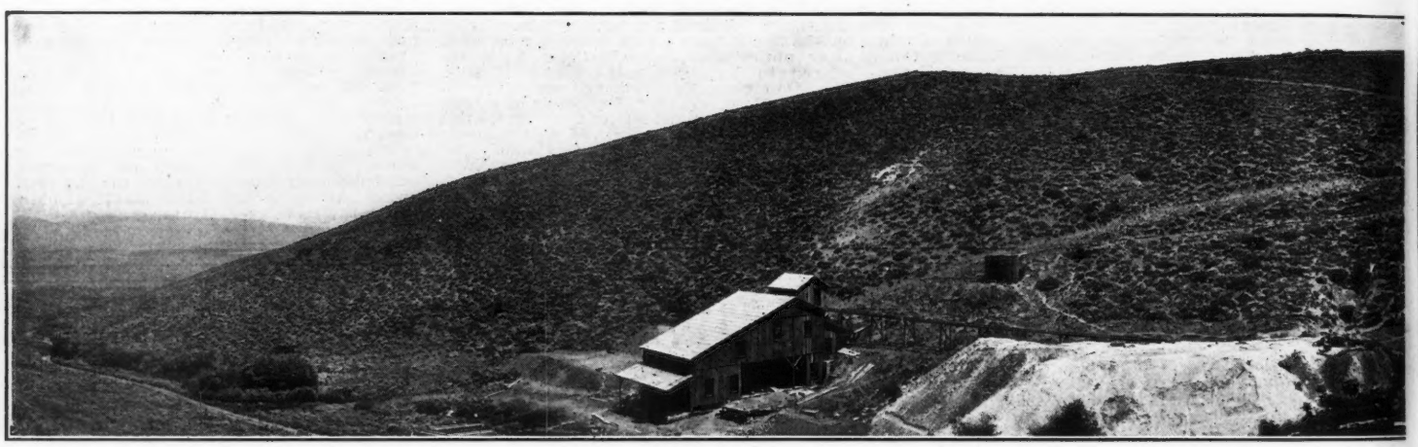
Joplin-Miami District

ADMIRALTY ZINC (Douthat)—Installing sand jig and additional tables. W. B. Shackelford manager.

DUDLEY MILLING (Douthat)—Erecting tailings mill to treat tailings from Admiralty No. 2.

HOPE LEAD & ZINC (Hockerville)—Moving old Scott Eagle mill from Quapaw to Hockerville.

UNDERWRITERS LAND (Picher)—Erecting new concentrator at No. 4 shaft at St. Louis, Okla.



COUNTRY NEAR RENO, NEV., SHOWING PROPERTY OF STANDARD METALS CO., WHICH OPERATES PEAVINE MINE

RIGHT GOOD (Quapaw)—Moving old McCurdy mill from Hockerville to Quapaw. E. Dunlap superintendent.

TEXAS

Bell County

B. & W. OIL & REFINING (Belton) — First test well 20 miles south, near Jarrell, showing oil in bailer, although no oil sand of commercial thickness passed through. Company locally organized, and holds leases on 18,000 acres of land in Bell and Williamson counties.

Brazoria County

WEST COLUMBIA FIELD PRODUCTION for third week in August 28,600 bbl. liquid daily, of which 18,000 bbl. was oil. Producing companies; Humble Oil & Refining Co., 13,300 bbl.; Gulf Production Co., 5,800; Crown Oil & Refining Co., 5,400; Texas Co., 4,000; Hannicker Co., 35. Twenty-three wells producing in field, largest being Humble company's No. 5 Japhet, making 4,500 bbl. oil daily. Several wells making 3,000 bbl. liquid, which settles out only 10% oil.

Hardin County

HUMBLE OIL & REFINING (Batson) —No. 1 Garza well down 300 ft.; good progress being made.

SAN BERNARD OIL (Saratoga)—No. 5 Hooks well making fair production by pumping from 1120 ft.

Harris County

DRILLING IN SHELDON FIELD being done by Crown Oil Co., Gulf Coast Oil Corporation, Crosby Petroleum Co., and Prendergast and associates.

Wichita County

PENN OIL & GAS (Burkburnett) — Michna well No. 1, on block 819, one mile west of producing area, has just struck top of sand at 1,530 ft. Good showing made, and casing being set. Most westerly discovery made in field.

UTAH

Juab County

TINTIC DRAIN TUNNEL (Eureka) — Present length of tunnel 3400-3500 ft. and not 400-500 ft., as reported in issue of Aug. 23.

Salt Lake County

EMMA SILVER (Alta)—Directorate of newly formed company: C. S. Burton, of Columbia Trust Co., president; John Dern, National Copper Bank, vice president; J. E. Galligher, J. M. Hayes, A. L. Hoppaugh, F. B. Cook; George Dern, general manager.

SOUTH HECLA (Alta)—Management reports operations but little interfered with by recent cave-in.

UTAH CONSOLIDATED (Bingham Canyon)—About twenty dwellings housing employes, majority belonging to company, destroyed by fire during night of Aug. 26.

UTAH METAL & TUNNEL (Bingham)—Particulars concerning re-financing contained in recent report from head office in Boston; 50,000 shares of stock purchased by syndicate at $4 a share. This stock part of 100,000 shares held by company for conversion of $750,000 7 per cent bonds. Company converted $375,000 of its bonds into stock, exchanged $225,000 for a like amount of 6 per cent bonds, which matured April 1, and still has about $150,000 bonds in treasury. Outstanding 750,000 shares. Floating debt of approximately $80,000 will be paid off and company will have $120,000 in treasury to renew mining operations.

Summit County

PARK CITY SHIPMENTS week ended Aug. 24: 2,828,600 lb. ore and concentrates. Shippers: Silver King Coalition, 1,180,620 lb.; Ontario, 640,000 lb.; Judge Mining & Smelting, 378,680 (zinc 100,000 lb.); Daly West, 221,300; Silver King Consolidated, 220,000; Iowa, 88,000.

NEW QUINCY (Park City)—Operations resumed at this property adjoining Daly West.

THREE KINGS (Park City)—P. J. Mackintosh, manager, to succeed W. R. Elliott, elected president of company.

WASHINGTON

Ferry County

IRON CREEK (Keller)—Mill of 25-tons capacity being erected. L. R. Richards, formerly with Canada Copper Corporation, has been elected manager.

Spokane County

ROSELLE MINING (Spokane)—Alien Property Custodian ordered sale of 337,766 shares of common capital stock of Roselle Mining Co. and 99,996 shares of common capital stock of American Tungsten Consolidated Corporation. Sale to take place at office of Roselle Mining Co., 605 Columbia Bldg., Spokane, on Sept. 27. Prior to war these companies owned and operated about 659 acres of tungsten claims in Stevens County, Washington, originally developed by Germania Mining Co. Stock of Roselle company held by Charles S. Cullen, of Ocala, Fla., for Schillman & Bene, of Hamburg, Germany.

LOON LAKE COPPER (Loon Lake)—First two cars of concentrates shipped from flotation plant. Mill receiving about 75 tons daily on two shifts and expects to add third shift when labor supply will permit.

WYOMING

Albany County

NATIVE COPPER (Tie Siding)—Company operating mines at Tie Siding, 20 miles south of Laramie on Union Pacific R.R., has discovered small amounts of platinum in copper ore.

WISCONSIN

Zinc-Lead District

ROSS (Linden)—David MacKay and Milwaukee interests have taken over and will operate Ross mine at Linden.

VINEGAR HILL ZINC (Platteville)—Continued drilling on Coulthard land east of Field-Thompson gives assurance of another mine. Good borings found in extensive drilling on Buxton-Sherry-Pedelty tracts, east of old drum at lead mine. New run located by drill 1,000 ft. south of North Unity mine. Drilling and shaft sinking in progress at Copeland, near Shullsburg, and drilling has begun on William Fields land at New Diggings.

WISCONSIN ZINC—(Platteville)—Drilling on David Booty land adjoining Winskell on west, at New Diggings, gives promise of shaft development. Edge tract of 600 acres, at New Diggings, and Bushnell land just east of Platteville have been leased for drillings.

ZINC HILL (Platteville)—Milling started at Little Dick No. 2 at Cuba City.

PAQUETTE (Shullsburg) — Platteville company assembling small milling equipment at this property, already opened up by shaft.

CANADA

British Columbia

BIG MISSOURI GROUP in Salmon River district owned by Sir Donald Mann to be diamond drilled, necessary plant having arrived at property. Drilling contract awarded to Boyle Brothers, of Anyox, B. C.

BULLION (Barkerville) — Ward-Hopp litigation for possession of this placer property decided by Privy Council in favor of Ward. Property reputed to be largest hydraulic mining operation in the world. Case before courts for last five years with property idle in meantime.

SPOKANE GROUP (Bayonne District)—Owners building an arrastra to be run by water power. Two carloads of gold and silver-lead ore have been packed out in last two years.

LUCKY JIM ZINC (Bear Lake)—Foreclosure proceedings to be taken immediately against owners of Lucky Jim mine in Slocan district. Action based on second mortgage of $35,000. Reorganization expected to follow.

CANADA COPPER (Grand Forks) — Nearly 150 men working at Copper Mountain building ore bins and preparing mine for producing as soon as railroad and mill are ready.

EVENING STAR (Slocan)—Cars, rails and other mine supplies forwarded through Nelson for operating Evening Star property on Dayton Creek near Slocan and Silver Nugget property near Silverton. William Moore supervising work.

Ontario

MILLER INDEPENDENCE (Boston Creek)—Contracts made with Northern Ontario Light & Power Co. for power to operate new mining and milling plant.

FOSTER (Cobalt)—Bought by Mining Corporation of Canada.

NIPISSING (Cobalt)—Financial statement as of Aug. 23 showed cash in bank, war bonds, ore in hand and in process and bullion ready for shipment to amount of $3,863,386. Company has secured leases of important oil lands in Texas on which drilling has reached depth of 1,200 ft.

WEBB-McCARTHY-MILLER (Goudreau)—Six claims of this group in Algoma district purchased by Consolidated Mining & Smelting Co. of Canada, conditions including construction of plant to cost $500.000. Contract for diamond drilling let to Smith & Travers, of Sudbury, and power will be secured from Michipicoten Power Co.

GRANBY-KIRKLAND (Kirkland Lake)—Has two claims about one mile northeast of Tough-Oakes, on which three promising veins varying from 3 to 5 ft. in width have been opened by trenching.

KIRKLAND - PORPHYRY (Kirkland Lake)—Has gone into voluntary liquidation and assigned to F. C. Clarkson, Toronto.

ANZAC (Porcupine)—Name of company changed to Wakenda.

DOME (Porcupine)—Unofficially stated that mill has latterly been treating ore of average grade of $9 per ton at the rate of about 600 tons per day. Operating costs are understood to be high. Mill heads will be reduced gradually as the milling capacity is increased.

DOME EXTENSION (Porcupine)—Three crosscuts at 600 level show good ore and fourth started.

PORCUPINE CROWN (Porcupine) — Entirely dewatered and working force largely increased. Operations will be conducted on large scale.

MARIGOLD (Swastika)—New orebody encountered on 200 level.

AUSTRALIA

New South Wales

DETAILS OF FIRE at Broken Hill which destroyed buildings of Broken Hill South mine on July 30 are as follows: No. 1 shaft poppet top brace, crude ore bins, Gates breaker structure, crushed ore bins completely destroyed. Mill engine house gutted. Table section and grinder section saved. New power house and winding engine safe. General manager estimates not less than 12 months required to replace destroyed building and machinery. Underground quite free of fire. Main shaft not much damaged fire and water. Plant destroyed covered by insurance, £33,000.

NORTH BROKEN HILL (Broken Hill)—Mine still shut down.

Western Australia

GREAT FINGALL CONSOLIDATED'S report for 1918 states that mine closed down in February, 1918, it having been found impossible to continue work without heavy loss. Since then every effort made to realize to best advantage assets of company in Western Australia. Considerable sales effected, but at end of year large portion of plant remained unsold. Efforts being made to realize on assets.

COMPANY RECENTLY INSTALLED 75-TON FLOTATION PLANT, WHICH IS NOW RUNNING STEADILY

THE MARKET REPORT

Daily and Weekly Metal and Mineral Prices, Metal Market Conditions, Average Monthly Prices, Stock Quotations

Silver and Sterling Exchange

Aug.	Sterling Exchange	Silver New York, Cents	Silver London, Pence	Sept.	Sterling Exchange	Silver New York, Cents	Silver London, Pence
28	424	111	58¾	1	....	....	59
29	420	108½	58	2	418½	113⅝	61
30	420	108½	58	3	418	113½	61

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London quotations are in pence per troy ounce of sterling silver, 925 fine.

Daily Prices of Metals in New York

Aug.-Sept.	Copper Electrolytic	Tin Spot	Lead N. Y.	Lead St. L.	Zinc St. L.
28	21¾@22	54¼@54¾	5.80@6.00	5.60@5.65	7.45
29	21⅞@22¼	54¼@54¾	5.80@6.00	5.60@5.65	7.45
30	21⅞@22¼	54¼@54¾	5.80@6.00	5.60@5.65	7.45
1	.....	.....	.....	.....	.....
2	22 @22¼	54½@54¾	5.80@6.00	5.60	7.45
3	22 @22¼	54½@54¾	5.80@6.00	5.60	7⅜

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for the deliveries constituting the major markets, reduced to basis of New York, cash, except where St. Louis is the normal basing point.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other special shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. We quote New York price at 35c. per 100 lb. above St. Louis. Tin is quoted on the basis of American tin, 99 per cent grade.

London

Aug. Sept.	Copper Standard Spot	Copper Standard 3 M.	Copper Electrolytic	Tin Spot	Tin 3M.	Lead Spot	Lead 3 M.	Zinc Spot	Zinc 3 M
28	97¾	98¾	...	271	266½	24¾	25⅜	37¾	38¼
29	99	100	...	272¾	267½	24⅞	25⅜	38¼	39¼
30	....	....	....	....	....	....	....	....	....
1	100¾	101¾	...	275¾	268¾	24⅞	25½	39¾	40¾
2	101⅛	102⅛	...	279	271½	24¾	25⅜	40½	41½
3	101½	102½	...	278½	272½	24¾	25⅜	41	42

The above table gives the closing quotations on the London Metal Exchange. All prices are in pounds sterling per ton of 2,240 lb.

Metal Markets

New York—Sept. 3, 1919

All of the markets were distressingly dull this week. There were scarcely any changes in prices and no new features of special interest.

Copper

The Export Association did a little business with neutral countries. This was mainly transacted by its foreign agents on c.i.f. terms. There was some inquiry from France in this market, which did not result in business. Germany bid for a few hundred tons, but did not offer to pay anything like our prices.

Domestic business was confined to second-hands, the principal producers holding firmly to their previous prices and making no sales. From second-hands copper was freely offered at about the same terms as in the previous week, but toward the close of this week it looked as if these offerings had been pretty well cleaned up by consumers and by more powerful interests that were willing to buy for an advance.

Nothing more was heard this week of offerings by Japanese and British houses, but in the early part of the week American interests bought copper in London. These were probably in the nature of arbitrage transactions.

Copper Sheets—The base price of copper sheets is 33½c. per lb. Demand strong. Copper wire is quoted at 26@26½c. in carload lots, f.o.b. mill. Market is dull.

Tin

The market for this metal stiffened a little during the latter part of the week, and on the whole a fair amount of business was done. At the close, tin of 99 per cent grade was quoted at 54½@54¾c., and Straits tin at 56c. Straits tin for September shipment from Singapore was 52c. at the beginning of the week and 53c. at the end. Singapore quoted c.i.f. London, £272 on Aug. 28 and 29, £270½ on Sept 1, £271½ on Sept. 2, and £273 on Sept. 3.

Arrivals of tin in this country in August were 5,215 tons, of which 3,000 was Straits and 2,215, other kinds. Deliveries were 2,270 at Atlantic ports and 2,075 at Pacific ports. Stocks, landing and in warehouse, were 920 tons at the end of the month.

George Armsby, chief in charge of tin of the War Industries Board, on Aug. 28 issued a statement to the tin trade giving the statistics on the tin situation while under control of the board. It is shown that there were received and distributed from Pacific Coast points 812,250 lb. at a total cost of $554,469, or 68¼c. per lb., while from points east of Chicago 21,982,866 lb. was received and distributed at a total cost of $15,281,016, or about 69½c. per lb., a total of 22,795,116 lb. with the cost $15,835,484, or a slight fraction under 69½c. A refund of nearly 3c. per lb. has been made to each buyer of the tin.

Lead

About the same conditions prevailed as in the previous week, lead being still offered at low prices by second-hands, but the amount of such offerings diminished. Producers did scarcely any business.

Zinc

The market was very dull throughout the week. Prime Western zinc was offered from numerous quarters at 7½c., and could be bought at 7.45c. On Sept. 2 a fair amount of business was done at that price, partly with galvanizers and partly with dealers. On Sept. 3 there was a distinctly weaker tone. Large dealers offered at 7.40c., and a large producer offered to sell at 7⅜c.

Zinc Sheets—The quoted price of zinc sheets is $10 per 100 pounds.

Other Metals

Aluminum—Virgin metal quoted at 33c. per lb. No change. Market quiet.

Antimony—The market was very quiet at substantially unchanged price. We quote spot at 8⅝@8¾c. Chinese houses maintain their optimistic attitude, and antimony for shipment is quoted at higher prices than for spot. Probably 9@9½c. would have to be paid.

Bismuth—We quote at $2.97.

Cadmium—Unchanged at $1.40.

Nickel—Ingot, 41c.; shot, 43c.; electrolytic, 45c. per pound.

Quicksilver—A large arrival from Italy influenced the market. The price quoted during the week was $95, at which figure it was rather weak.

Silver and Platinum

Silver—The silver market has experienced wide fluctuations in the last week. Closing at 61¾d. in London on Aug. 27, the price broke to 58d. on Aug. 29 and has risen to 61d. again on Sept. 2. These violent changes in London are due to a scarcity of spot silver, so that any urgent demand for the trade on the Continent is likely to cause a spurt in the price, and any large offerings a fall in the price.

On the sharp advance in the London price, China stopped buying, so that silver was thrown on the London market. On the break in London price, China buyers reappeared and absorbed all offerings. The London market is very limited and sensitive, but there seems to be a broad demand for the Far East.

Mexican dollars at New York: Aug. 28, 86⅝; Aug. 29, 84⅜; Aug. 30, 84⅜; Sept. 1, holiday; Sept. 2, 86¾; Sept. 3, 86¾.

Platinum—This metal continued in strong demand, with the result of further advance in price. We quote refined ingot at $110@$115.

Palladium—Unchanged at $120.

Zinc and Lead Ore Markets

Joplin, Mo., Aug. 30—Zinc blende, per ton, high, $49.75; basis 60 per cent zinc, premium, $48.50; Prime Western, $47.50; fines and slimes, $45@$42.50; calamine, 40 per cent zinc, $30. Average settling prices: Blende, $46.47; calamine, $30.40; all zinc ores, $46.24.

Lead, high, $65.05; basis 80 per cent lead, $62@$64; average settling price, all grades of lead, $62.85 per ton.

Shipments the week: Blende, 7,527; calamine, 112; lead, 1,035 tons. Value, all ores the week, $421,260.

Shipment eight months: Blende, 337,004; calamine, 9,142; lead, 49,629 tons. Value, all ores eight months, $17,202,320.

The blende tonnage is 19,916 greater than the same period of last year; the calamine tonnage is 4,781 less, a net gain for all zinc ores of 15,135 tons.

Railroads have furnished a few more cars, and there is an improvement in moving out loaded cars, yet there are over 300 loaded cars on sidetracks in the district.

Platteville, Wis., Aug. 30—Blende, basis 60 per cent zinc, $46 base for both premium grade and high lead or Prime Western grade. Lead ore, basis 80 per cent lead, $65 per ton. Shipments reported for the week are 1,777 tons blende, 275 tons galena and 637 tons sulphur ore. For the year to date the totals are 66,568 tons blende, 4,087 tons galena and 10,752 tons sulphur ore. During the week 3,481 tons blende was shipped to separating plants.

Other Ores

Chrome Ore—Recent sales have been on the basis of $20 per ton, f.o.b. California points.

Manganese Ore—Metallurgical ore is quoted at 50@60c. per unit.

Molybdenum Ore—A little more inquiry was reported, but no business seems to have resulted.

Tungsten Ore—Chinese ore was offered at $7.50 per unit and Bolivian ore at $10, duty to be paid by the buyer if tariff be imposed. Buyers seem to be unwilling, however, to pay those prices, and those who were recently offering to pay $7@$7.25 seem to have disappeared.

Other Minerals

Graphite—Decided dullness is reported in both Ceylon and Alabama grades, the effect of any increased steel production not being felt, owing to stocks remaining in the hands of crucible manufacturers which were purchased last autumn and winter. The prices for Ceylon grades have remained firm, because of the fact that the rupee has maintained its price level in foreign exchange and on account of the comparatively high cost of labor, preventing profitable operation at lower prices. The market for Alabama grades continues very dull, producers having adopted a waiting attitude and making no attempt to sell. Quotations for Ceylon grades are as follows: Lump, 13¾@14½c.; chip, 10½@11c.; dust, 7½@8c. All prices are c.i.f. New York, ex ship.

Nitrate—Conditions continue to be reported dull, no change occurring from the previous week. Spot supplies are quoted at $2.90@$2.95 per cwt., carload lots.

Pyrites—Spanish pyrites is quoted at 17½c. per unit for furnace size ore, free from fines, c.i.f. New York or other Atlantic port. Market slow and unsettled; hand-to-mouth buying. Very little ore coming in. Price will decrease with ocean freights.

Sulphur—No change has occurred from the previous week. Prices are quoted at $18 per ton, carload lots, domestic delivery, and $20 for export. Both quotations are at mines, Freeport, Tex., and Sulphur Mine, La.

Iron Trade Review

New York, Sept. 3

With labor difficulties temporarily out of the way, the iron and steel trade is now beginning to devote itself closely to the likely commercial developments of the next few months, according to *The Iron Age*. Multiplied bits of evidence have fully proved that the sentiment among the wage earners is heavily against a test of union strength, and so far as wage advances are concerned there is a widening circle of thinking workers who realize the impossibility of reducing living costs with continual wage advances and at the same time little consideration to increasing unit production. The more cheerful outlook comes largely from the President's proposal for a conference of employers of labor and labor officials, whatever may be the disposition of the "putting the whole question of wages upon another footing."

Pittsburgh—Sept. 2

The great change that has occurred in the labor situation and prospects in the last week is the dominant factor in the iron and steel market. A feeling of relief pervades the entire trade, as it is now practically a certainty that there will be no interruption to production from labor disturbances. At no time was it the balance of probability that there would be a strike or a voluntary closing of plants, but there were distinct possibilities of such occurrences. Immediately after the publication of the President's statement referred to a week ago, a committee constituted by the unions that had been attempting to organize the iron and steel industry endeavored to secure a conference with the manufacturers, approaching Judge Gary to this end, and threatened to call a strike if a conference were not arranged. As the Steel Corporation has always conducted an "open shop," and does not deal with organized labor in any manner, Judge Gary refused a personal interview. Meanwhile, Samuel Gompers, president of the American Federation of Labor, returned from a trip abroad. It is believed he disapproved strongly of the strike threat. Last Friday the committee endeavored to enlist the President's influence in the matter of bringing about a conference, and the President evidently refused. Yesterday a statement of the President was published to the effect that he intends to call a general conference on labor matters, which will probably be held early in October, whereby all questions may be settled peacefully. It is remarked that the strike committee has made such utterly untrue statements as to the condition of steel workers that the steel manufacturers would be glad to have the actual facts brought to public attention. It is not beyond the possibility that the abolition of twelve-hour work in the iron and steel industry, which has been in progress for years, will soon be made practically complete, with an increase in the rate paid per hour, but with a decrease in the daily rate.

Iron and steel prices are absolutely stabilized by present conditions. There is no general disposition to advance prices, even if that could be done without bringing about fresh demands on the part of labor, while in quarters where there has been such a disposition the feeling has been disappearing. If it is even probable that should there be a slight increase in manufacturing costs in the next couple of months through wage adjustments, leading producing interests would be disposed to absorb the increase rather than pass it on to the buying public.

Bookings by steel mills during the month of August were very heavy, far exceeding production. In the case of the American Sheet & Tin Plate Co. the bookings represented twice the capacity, while production was at about 90 per cent of capacity. In this and other cases the bookings were chiefly in the form of specifications against contracts. There is little contracting now, as most of the business for the remainder of the year is already under contract. The steel industry will easily be able to operate for the rest of the year at its present rate of 75 to 80 per cent of capacity. The difference between output and capacity is accounted for by some departments, such as plate mills, not being fully supplied with orders, and by production at most plants being at less than capacity simply because the men are not keen to work hard. About 90 per cent of the productive units of the country are in operation.

Pig Iron—The pig-iron market has continued inactive. There is little inquiry, and offerings are equally limited. The furnaces in operation are comfortably sold up, while those idle are not disposed to resume at this time. Prices are quite firmly maintained. Reports from some sections that sales have been made for next year's delivery are to be taken with some grains of salt, and in any event nothing of the sort is reported as to the local market. We quote prices unchanged: Bessemer, $27.95; basic, $25.75; malleable, $26.25 to $27.25; foundry, $26.75; forge, $25.75, f.o.b. Valley furnaces, with $1.40 freight to Pittsburgh. W. P. Snyder & Co. report average prices for August, based on actual tonnage sales of Valley iron, at $27.95 for bessemer and $25.75 for basic. Foundry iron was quotable at $26.75 throughout the month.

Steel—Sheet bars continue scarce, but there has been less inquiry in the open market in the last week. Rolling billets continue in light request, while there is a moderate turnover in forging billets. We quote: Billets, $38.50; sheet bars and small billets, $42; slabs, $41; forging billets, $51; rods, $52.

Ferromanganese—Consumers are not inquiring to any extent. Asking prices remain at $105, c.i.f., for English, and $110, delivered, for domestic 80 per cent. It is believed these prices might be shaded somewhat on desirable orders.

Coke—As late as last Thursday spot furnace coke sold at $4.50, but partly through buying and partly through expectations that this week's output would be curtailed by the holiday, the market stiffened, and $4.75 is the lowest that could be done today, while $5 might have to be paid. Foundry coke is also stiffer, but is still quotable at $5.50 to $6.25, the lower quotation being difficult to secure, and then being applicable only on shipments in open-top cars. Prices are per net ton at ovens, Connellsville region.

MONTHLY AVERAGE PRICES OF METALS

Silver

	New York			London		
	1917	1918	1919	1917	1918	1919
Jan.	75.630	88.702	101.125	36.682	44.356	48.438
Feb.	77.585	85.716	101.125	37.742	42.792	48.027
Mar.	73.861	88.082	101.125	36.410	43.620	48.171
April	73.875	95.346	101.125	36.963	47.215	48.886
May	74.745	99.505	107.135	37.940	48.980	52.104
June	76.971	99.500	110.430	39.065	48.875	53.896
July	79.010	99.625	106.394	40.110	48.813	54.133
Aug.	85.407	100.292	111.370	43.418	49.077	58.835
Sept.	100.740	101.125	.....	50.920	49.500	.....
Oct.	87.332	101.125	.....	44.324	49.500	.....
Nov.	85.891	101.125	.....	43.584	48.969	.....
Dec.	85.960	101.125	.....	43.052	48.492	.....
Year	81.417	96.772	.....	40.851	47.516	.....

New York quotations cents per ounce troy, 999 fine London, pence per ounce, sterling silver, 925 fine.

Copper

	New York		London			
	Electrolytic		Standard		Electrolytic	
	1918	1919	1918	1919	1918	1919
Jan.	23.500	(a)	110.000	92.238	125.000	106.619
Feb.	23.500	16.763	110.000	78.700	125.000	95.700
Mar.	23.500	14.856	110.000	76.821	125.000	82.071
April	23.500	15.246	110.000	77.300	125.000	82.200
May	23.500	15.864	110.000	77.767	125.000	81.227
June	23.500	17.610	110.000	83.062	125.000	85.900
July	25.904	21.604	119.913	99.576	134.913	103.046
Aug.	26.000	22.319	122.000	97.300	137.000	.....
Sept.	26.000	.....	122.000	.....	137.000	.....
Oct.	26.000	.....	122.000	.....	137.000	.....
Nov.	26.000	.....	122.000	.....	137.000	.....
Dec.	(a)	.....	118.447	.....	133.167	.....
Year	24.628	.....	115.530	.....	130.507	.....

(a) No market.

Tin

	New York		London	
	1918	1919	1918	1919
January	85.500	67.702	293.227	248.557
February	92.000	66.801	311.525	223.963
March	(a)	67.934	318.875	236.843
April	(a)	72.500	329.905	225.275
May	(a)	72.500	364.217	234.398
June	(a)	71.240	331.925	238.263
July	(a)	68.000	360.347	253.272
August	(a)	57.226	380.900	273.625
September	(a)	.....	343.905	.....
October	(a)	.....	335.543	.....
November	(a)	.....	323.550	.....
December	(a)	.....	267.736	.....
Av. year	(a)	.....	330.138	.....

(a) No average computed.

Lead

	New York		St. Louis		London	
	1918	1919	1918	1919	1918	1919
January	6.782	5.432	6.684	5.316	29.00	37.227
February	6.973	5.057	6.899	4.784	29.00	28.675
March	7.201	5.226	7.091	4.992	29.00	27.952
April	6.772	4.982	6.701	4.722	29.00	24.888
May	6.818	5.018	6.704	4.773	29.00	23.852
June	7.611	5.340	7.511	5.070	29.00	22.544
July	8.033	5.626	7.750	5.408	29.00	23.457
August	8.050	5.798	7.750	5.583	29.00	24.750
September	8.050	.....	7.750	.....	29.00	.....
October	8.050	.....	7.750	.....	29.00	.....
November	8.050	.....	7.750	.....	31.20	.....
December	6.564	.....	6.324	.....	40.00	.....
Year	7.413	.....	7.222	.....	30.10	.....

Zinc

	New York		St. Louis		London	
	1918	1919	1918	1919	1918	1919
January	7.836	7.272	7.661	7.922	54.000	56.045
February	7.814	6.623	7.639	6.273	54.000	46.150
March	7.461	6.500	7.286	6.150	54.000	38.500
April	6.890	6.465	6.715	6.114	54.000	36.118
May	7.314	6.429	7.114	6.079	54.000	35.477
June	8.021	6.901	7.791	6.551	54.000	36.763
July	8.688	7.873	8.338	7.523	54.000	41.815
August	8.985	7.789	8.635	7.439	54.000	39.338
September	9.442	.....	9.092	.....	54.000	.....
October	8.801	.....	8.451	.....	54.000	.....
November	8.481	.....	8.141	.....	54.100	.....
December	8.163	.....	7.813	.....	56.050	.....
Year	8.159	.....	7.890	.....	54.180	.....

New York and St. Louis quotations, cents per pound. London, pounds sterling per long ton.

Pig Iron, Pittsburgh

	Bessemer‡		Basic‡		No. 2 Foundry	
	1918	1919	1918	1919	1918	1919
January	$37.25	$33.60	$33.95	$31.40	$33.95	$32.40
February	37.25	33.60	33.95	31.40	33.95	32.40
March	37.25	32.54	33.95	31.40	33.95	29.12
April	36.15	29.35	33.95	27.15	33.95	28.15
May	36.20	29.35	33.00	27.15	34.00	28.15
June	36.36	29.3	33.16	27.15	34.16	28.15
July	36.60	29.35	33.40	27.15	34.40	28.15
August	36.60	29.35	33.40	27.15	34.40	28.15
September	36.60	.....	33.40	.....	34.40	.....
October	36.60	.....	34.40	.....	35.40	.....
November	36.60	.....	34.40	.....	35.40	.....
December	36.60	.....	34.40	.....	35.40	.....
Year	$36.67	.....	$33.70	.....	$34.45	.....

‡ As reported by W. P. Snyder & Co.

STOCK QUOTATIONS

N. Y. Exch.† Sept. 2	
Alaska Gold M.	2½
Alaska Juneau	2¾
Am.Sm.&Ref.,Com.	78
Am.Sm. & Ref.,pf.	103½
Am.Sm.Sec., pf., A.	88
Am. Zinc	24
Am. Zinc, pf.	61
Anaconda	69½
Batopilas Min.	1¼
Bethlehem Steel	84
Butte & Superior	26¼
Butte Cop. & Zinc	12¼
Cerro de Pasco	55
Chile Cop	23¾
Chino	44½
Colo. Fuel & Iron	45½
Crucible Steel	177½
Crucible Steel, pf.	101
Dome Mines	13½
Federal M. & S.	13
Federal M. & S., pf.	33¼
Great Nor., ore ctf.	43½
Greene Cananea	41½
Gulf States Steel	59
Homestake	74
Inspiration Con.	62
International Nickel	26½
Kennecott	37½
Lackawanna Steel	80½
Mexican Petrol.	193
Miami Copper	27¼
Nat'l Lead, com.	79
National Lead, pf.	105
Nev. Consol.	18¼
Ontario Min.	6¼
Ray Con	24¼
Republic I.&S.,com.	91
Republic I.&S., pf.	104½
St. Joseph Lead	14½
Sloss-Sheffield	65
Tennessee C. & C.	13½
U. S. Steel, com.	105
U. S. Steel, pf.	115¼
Utah Copper	86¼
Va. Iron C. & C.	61
Worthington Pump.	73

Boston Curb * Sept. 2	
Boston Ely	1½
Boston & Mont.	.78
Butte & Lon'n Dev.	.18
Calaveras	1½
Chief Con.	3¾
Contact	.30
Cortez	.12
Crown Reserve	.25
Crystal Cop.	12
Crystal Cop. (new)	.59
Eagle & Blue Bell	2¼
First Nat. Cop.	1¼
Gadsen Cop.	4½
Houghton Copper	1
Intermountain	‡.05
Iron Blossom	‡.25
Iron Cap	12
Majestic	.25
Mexican Metals	.05
Mojave Tungsten	.12
Nat. Zinc & Lead	.08
Nevada-Douglas	.16
New Baltic	3½
Oneco	.75
Rex Cons.	.20
United Verde Ex.	43
Yukon Gold	1½

San Fran.* Aug. 26	
Andes	.20
Best & Belcher	.08
Caledonia	.20
Challenge Con.	.15
Confidence	‡.25
Con. Virginia	1.75
Gould & Curry	.06
Hale & Norcross	‡.19
Jacket-Cr. Pt.	.11
Mexican	.12
Occidental	‡.40
Ophir	1.40
Overman	.08
Savage	.15
Sierra Nevada	.12
Union Con.	.16
Utah Con.	‡.03
Belmont	3.00
Jim Butler	.30
MacNamara	.57
Midway	.17
Mont.-Tonopah	.11
North Star	.06
Rescue Eula	.16
West End. Con.	1.30
Atlanta	.03
Booth	.06
Comb. Frac.	.04
Florence	.42
Jumbo Extension	.10
Kewanas	.04
Nevada Hills	.03
Nevada Packard	.30
Round Mountain	.34
Silver Pick	.06
Simon	1.77½
White Caps	.16

Colo. Springs * Aug. 26	
Cresson Con.	2.75
Doctor Jack Pot	.03
Elkton Con.	.03¼
El Paso	.19
Gold Sovereign	‡.02
Golden Cycle	1.58
Granite	.10
Isabella	.04¼
Mary McKinney	‡.06½
Portland	.95
United Gold M.	.16½
Vindicator	.39½

Boston Exch.† Sept. 2	
Adventure	‡1½
Ahmeek	‡82
Algomah	‡1
Allouez	‡44
Ariz. Com.	15½
Arnold	‡ 50
Bingham Mines	18½
Butte-Balaklava	‡.65
Calumet & Ariz.	78
Calumet & Hecla	420
Carson Hill	24½
Centennial	‡16½
Copper Range	54
Daly West	‡3
Davis-Daly	9½
East Butte	18½
Franklin	5
Granby	‡73½
Hancock	17¼
Hedley	‡12
Helvetia	‡5½
Indiana	‡11
Isle Royale	34½
Keweenaw	‡1½
Lake	6½
La Salle	4
Mason Valley	‡3½
Mass	7½
Mayflower	9½
Michigan	9
Mohawk	71
New Arcadian	‡44½
New Cornelia	26
New Idria	11
Nipissing	10½
North Butte	15½
North Lake	‡1½
Ojibway	2½
Old Dominion	41
Osceola	‡62
Quincy	71
St. Mary's M. L.	61
Santa Fe	‡.35
Seneca	22½
Shannon	3¼
Shattuck-Ariz.	‡15½
So. Lake	2½
So. Utah	‡.35
Superior	17½
Superior & Bost.	‡3½
Trinity	⅞
Tuolumne	2
U. S. Smelting	66½
U. S. Smelting, pf.	48
Utah Apex	2½
Utah Con.	10½
Utah Metal	4
Victoria	‡3½
Winona	2½
Wolverine	26½

N. Y. Curb.† Sept. 2	
Alaska B. C. Met.	1
Alaska Mines	.50
Big Ledge	¼
Butte & N. Y.	.50
Caledonia	.44
Calumet & Jerome	¼
Can. Cop. Corpn.	1½
Cashboy	.06
Con. Ariz. Sm.	1½
Con. Coppermines	6½
El Salvador	3½
Goldfield Con.	‡.17
Goldfield Merger	.04
Hasbrouck Divide	.12
Hecla Min.	5¼
Howe Sound	‡44
Louisiana	.50
Magma	‡40
Marsh	.11½
McKinley-Dar-Sa.	‡.60
Milford	‡.75
Mother Lode	.47
Mother Lode, (new)	4½
Nixon Nevada	.25
Ohio Cop.	‡.50
Rawley	‡2½
Ray Hercules	2¼
Richmond	‡.50
Rochester Mines	.17
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